

Astronomy & Space



FROM THE HOUSE OF SEAR CHUTE & KATHY

THE MOON — Our Strange Neighbour — 1

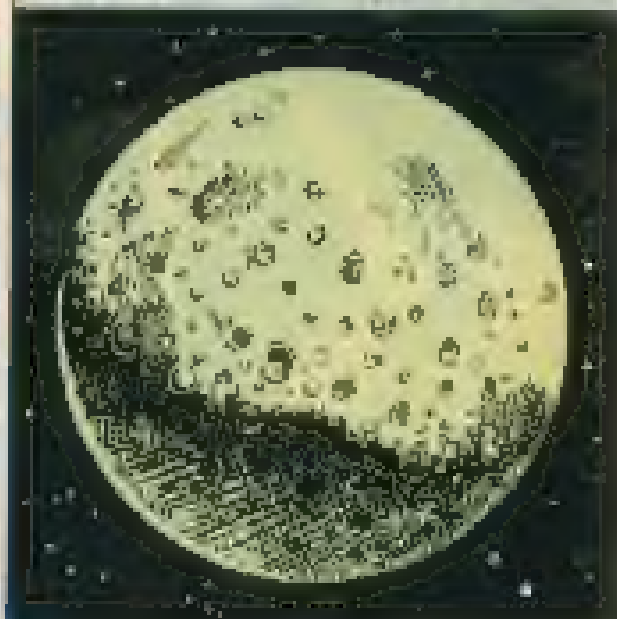
Story: J. D. Lister

Illustrations: Arnold Mould

WHEN GALILEO TURNED HIS TELESCOPE ON THE MOON FOR THE FIRST TIME IN 1609...



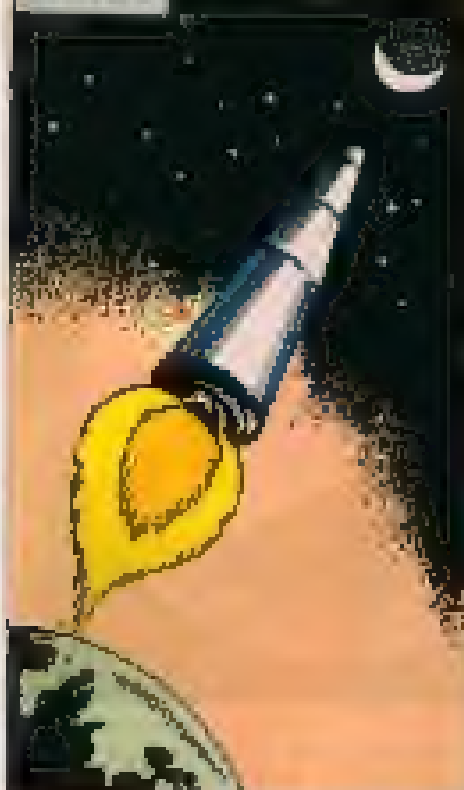
... HE WAS AMAZED TO SEE MOUNTAINS AND CRATERS AND PLAINS ON IT.



SOME OF THE MOUNTAIN PEAKS ARE OF GIANT HEIGHT. THE LUNAR MOUNTAIN, CEBRAITE IS HIGHER THAN MT. EVEREST. THE CRATERS ARE OF VARIOUS SIZES — SOME AS SMALL AS PEANUTS, OTHERS SEVERAL KILOMETRES IN DIAMETER. THERE IS ONE FACTOR COMMON TO ALL THESE CRATERS: THEY ARE ALL CIRCULAR.



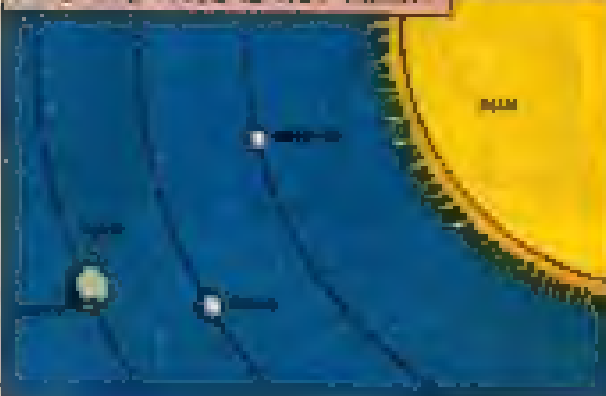
THE MOON IS OUR NEAREST NEIGHBOUR AND THE ONLY ONE EVER TO HAVE BEEN VISITED BY MAN.



IT IS ONLY ABOUT 2,38,380 KM AWAY FROM US. IF IT WERE POSSIBLE TO LAY TRACKS BETWEEN THE EARTH AND THE MOON, IT WOULD TAKE A TRAIN, TRAVELLING AT AN AVERAGE SPEED OF 130 KM PER HOUR, 130 DAYS TO REACH THE MOON.



YOU MAY CONSIDER THIS A VERY LONG DISTANCE, BUT COMPARED TO THE DISTANCES OF OTHER HEAVENLY BODIES THIS DISTANCE IS NOT MUCH.



THE MOON IS ROUGHLY A QUARTER OF THE SIZE OF THE EARTH, BUT AS FAR AS ITS WEIGHT IS CONCERNED, IT WOULD TAKE 81 MOONS TO EQUAL THE WEIGHT OF THE EARTH.



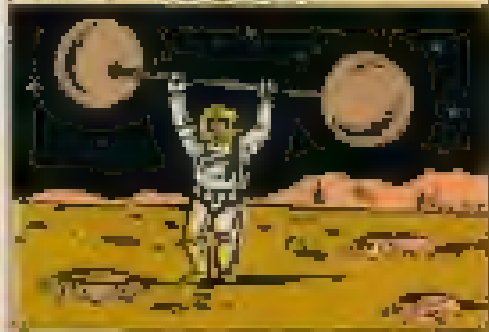
ALL OBJECTS THAT ARE DROPPED FROM A HIGH POINT OR THROWN UP WILL COME BACK TO EARTH. ULTIMATELY THE EARTH 'PULLS' THEM ALL. THIS PULL OF THE EARTH IS CALLED GRAVITY.



THE WEIGHT OF EVERYTHING DEPENDS ON GRAVITY. THIS MAN CANNOT LIFT THIS ONE-BELL WEIGHING 180 LBS.



BUT HE WOULD BE ABLE TO LIFT IT EASILY ON THE MOON BECAUSE THERE IT WOULD WEIGH ONLY 30 LBS. THE MOON'S GRAVITY OR PULLING POWER IS ONLY 1/6TH THAT OF THE EARTH.



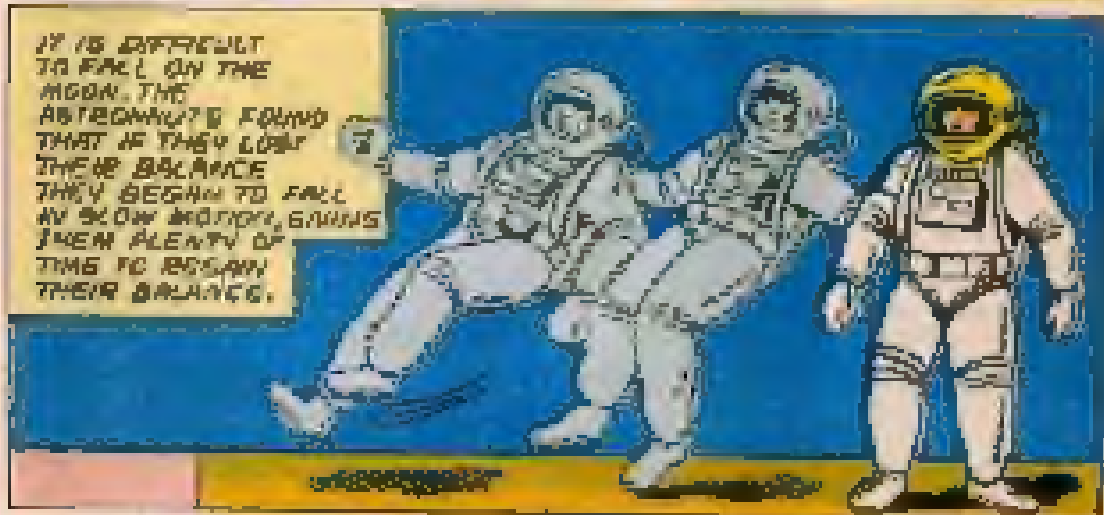
YOU CAN'T JUMP TOO HIGH ON THE EARTH, BECAUSE THE EARTH PULLS YOU DOWN VERY STRONGLY. IF YOU CAN JUMP 4 FEET HIGH HERE...



...ON THE MOON, YOU WOULD BE ABLE TO JUMP 24 FEET (7.4 M) BECAUSE EVEN THOUGH YOU WOULD BE SIX TIMES LIGHTER THERE, YOUR ENERGY WOULD REMAIN THE SAME.



IT IS DIFFICULT TO FALL ON THE MOON. THE ASTRONAUTS FOUND THAT IF THEY LOST THEIR BALANCE THEY BEGAN TO FALL IN SLOW MOTION, GIVING THEM PLENTY OF TIME TO REGAIN THEIR BALANCE.



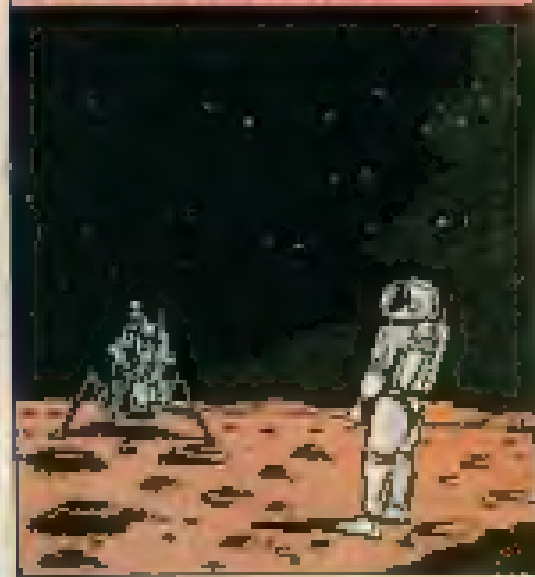
THE MOON — Our Strange Neighbour — 2

Script: Jill Baker Illustrations: Anne Morda

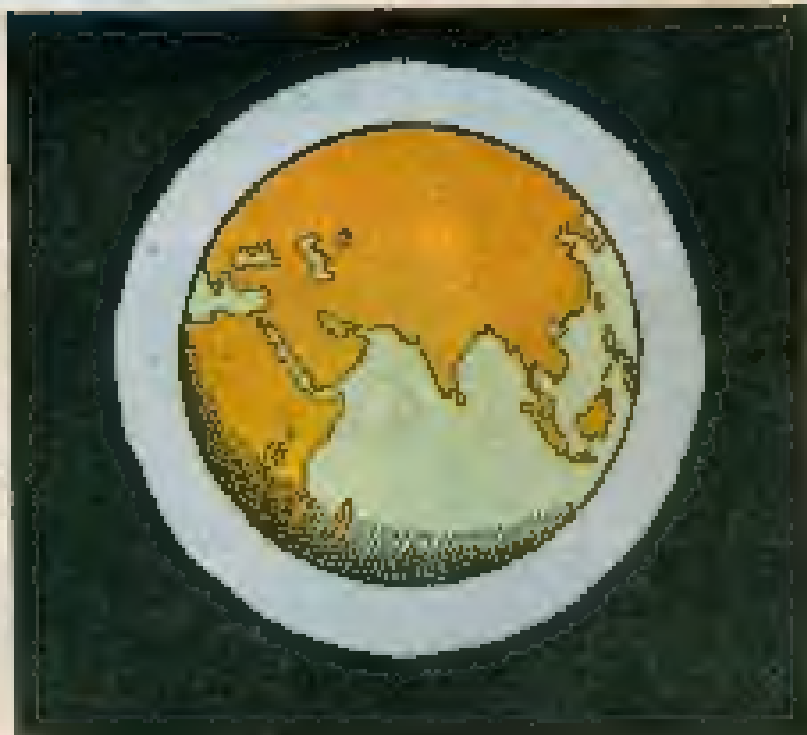
WE ARE USED TO BLUE SKIES...



BUT DID YOU KNOW THAT THE SKY ABOVE THE MOON IS PITCH BLACK EVEN DURING THE DAY? IT'S BECAUSE THERE'S NO AIR THERE.



OUR EARTH HAS A BLANKET OF AIR AROUND IT. THIS BLANKET OF AIR IS CALLED THE ATMOSPHERE. THE ATMOSPHERE MAKES OUR SKY LOOK BLUE AND IT DOES MANY OTHER THINGS BESIDES. AT THE DAYTIME IT SHIELDS THE EARTH FROM THE SUN'S HEAT AND AT NIGHT IT PREVENTS HEAT FROM THE EARTH FROM ESCAPING INTO SPACE.



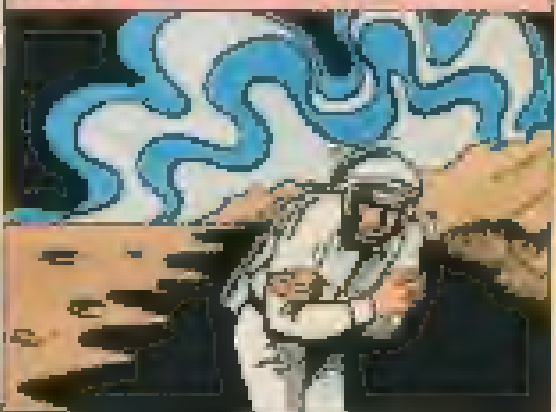
THE POOR MOON HAS NO ATMOSPHERE TO PROTECT IT. DURING THE DAY THE SUN BEATS DOWN MERCILESSLY AND DIRECTLY ON THE MOON'S SURFACE AND THE TEMPERATURE GOES UPEN THE BOILING POINT. IF A MAN WERE SUDDENLY TO FIND HIMSELF ON THE MOON, HIS BLOOD WOULD BOIL IN THE HEAT...



... HE WOULD LEAP INTO A SHADDED PLACE ...



... AND THERE HE WOULD SHIVER WITH COLD.

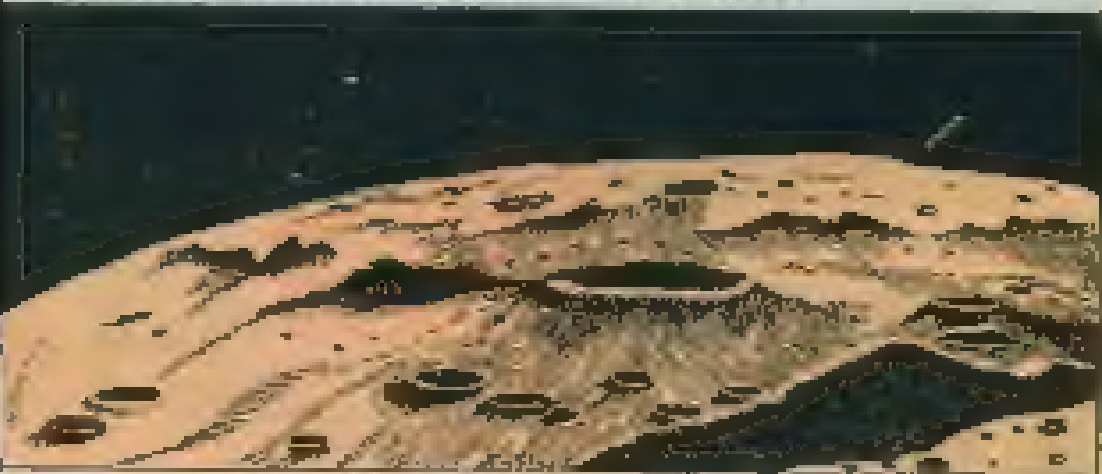


ON EARTH, HEAT IS CARRIED FROM ONE PLACE TO ANOTHER BY AIR AS THERE IS NO AIR ON THE MOON. HEAT STAYS WHERE IT IS WITHOUT SPREADING AROUND.

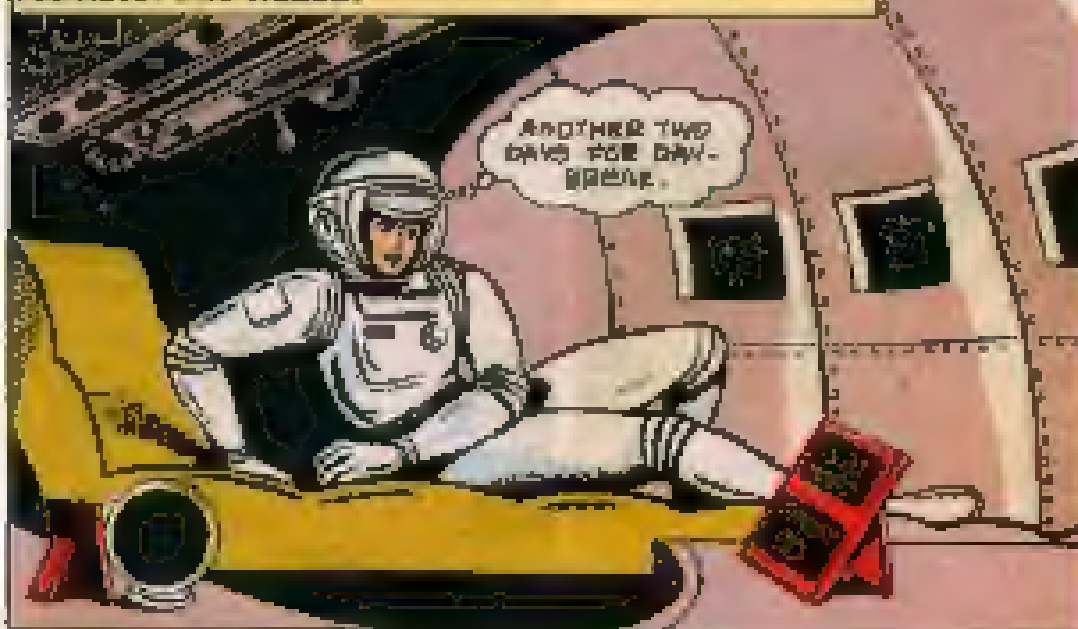
THE AREA EXPOSED TO SUNLIGHT BECOMES VERY, VERY HOT.

BUT SHADDED PLACES REMAIN BITTERLY COLD.

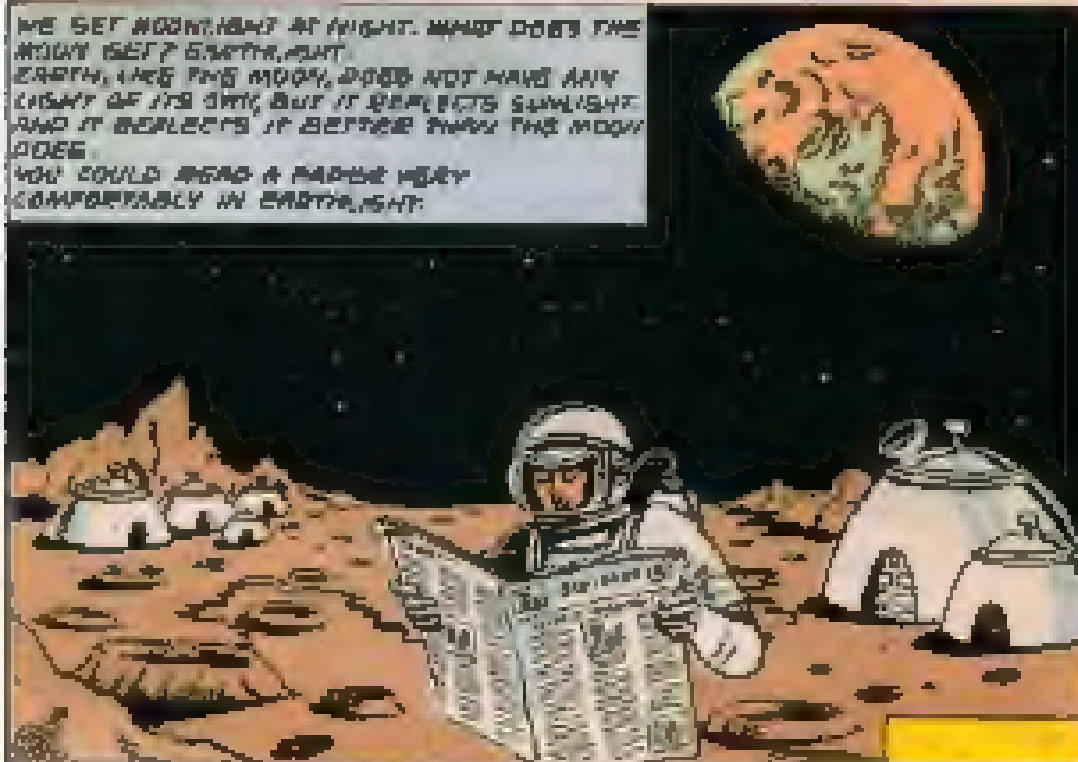
THE WHOLE LAND BECOMES BITTERLY COLD THE MOMENT THE SUN GOES DOWN. AT NIGHT THE TEMPERATURE ON THE MOON IS -150°C .



IT MAY SURPRISE MANY OF YOU TO KNOW THAT THE MOON TOO HAS DAYS AND NIGHTS. BUT DAYLIGHT THERE GOES ON FOR ABOUT TWO WEEKS OF OUR TIME AND WHEN NIGHT FINALLY COMES, IT TOO STRETCHES ON FOR ABOUT TWO WEEKS.



WE SET MOONLIGHT AT NIGHT. WHAT DOES THE MOON GET? EARTHLIGHT. EARTH, LIKE THE MOON, DOES NOT HAVE ANY LIGHT OF ITS OWN, BUT IT REFLECTS SUNLIGHT. AND IT REFLECTS IT BETTER THAN THE MOON DOES. YOU COULD READ A MAGAZINE VERY COMFORTABLY IN EARTHLIGHT.



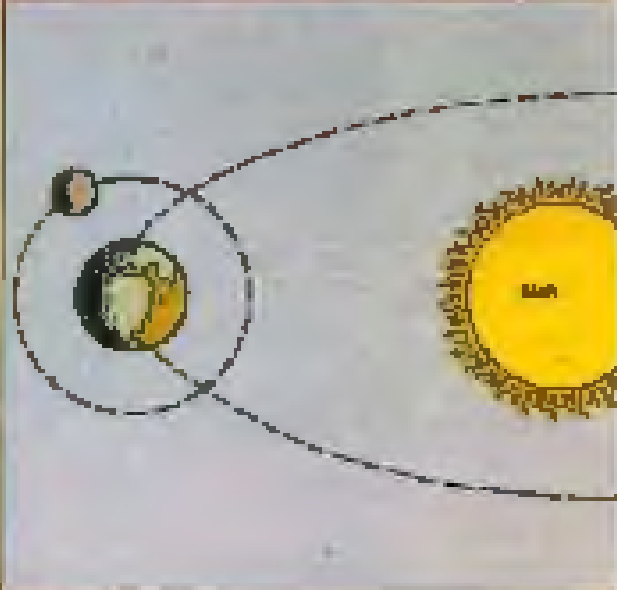
THE MOON — Our strange neighbour — 3

Text by J. D. (Mug) • Illustrations by Arnold Mander

THE MOON GOES ROUND THE EARTH. IT MOVES VERY FAST, COVERING ABOUT 60,000 MILES PER DAY.

YET IT TAKES 27 1/2 DAYS TO CIRCLE THE EARTH ONCE. AS IT GOES ROUND THE EARTH, IT ALSO GOES LIKE A TOP.

A TOP SPINS VERY FAST. IT TAKES NO TIME AT ALL TO MAKE ONE TURN. BUT THE MOON SPINS VERY SLOWLY IN COMPARISON. IT TAKES 27 1/2 DAYS TO MAKE ONE TURN. YOU WILL NOTICE THAT IT TAKES THE SAME NUMBER OF DAYS TO TURN ONCE ROUND ITSELF AND TO MAKE ONE ORBIT ROUND THE EARTH.



IF YOU KEEP A CHAIR IN THE CENTRE OF A ROOM AND GO ROUND IT IN AN ANTI-CLOCKWISE DIRECTION, IT IS YOUR LEFT SIDE WHICH WILL BE TURNED TOWARDS IT ALL THE TIME.



SIMILARLY, AS THE MOON TRAVELS ROUND THE EARTH, IT KEEPS THE SAME SIDE TURNED TOWARDS THE EARTH. WHEN GALILEO LOOKED AT THE MOON THROUGH HIS TELESCOPE, IT WAS THE SIDE THAT HE SAW.

NOBODY KNEW WHAT THE MOON SIDE OF THE MOON LOOKED LIKE UNTIL 1959. IN THAT YEAR THE RUSSIAN SPACE-CRAFT, LUNA 3, PASSED BEHIND THE MOON, TOOK PICTURES AND SENT THEM BACK TO EARTH.

IT WAS FOUND THAT THE MOON SIDE LOOKED VERY MUCH LIKE THE SIDE TURNED TOWARDS US.

HAVE A LOOK AT THE FRIENDLY FACE OF THE MOON (SEE ABOVE US). THERE ARE PLACES WITH WATERS LIKE SEA OF CLOUDS (HARE ALBUN), SEA OF NECTAR (HARE NECTAR) AND SEA OF RAINS (HARE INBIGH). ACTUALLY THERE ARE NO SEAS OR RIVERS OR RAINS ON THE MOON. IN FACT, THERE IS NOT A DROP OF WATER THERE. THE SEAS MENTIONED ARE EMPTY SMOOTH PLAINS.



JUST AS THE MOON TRAVELS AROUND THE EARTH, THE EARTH TRAVELS AROUND THE SUN. ONCE A MONTH, THE SUN, EARTH AND MOON ARE IN THIS POSITION.



EARTH



MOON



SUN

THE SIDE OF THE MOON TURNED TOWARDS THE EARTH IS NOT LIGHTED UP BY THE SUN AND SO WE CAN'T SEE THE MOON AT ALL. WE SAY IT IS A NEW MOON.

TWO WEEKS LATER, THE SUN, THE EARTH AND THE MOON ARE IN THIS POSITION —

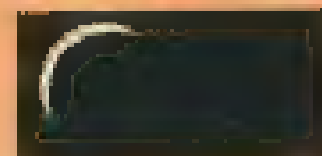
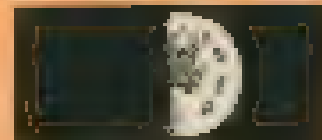
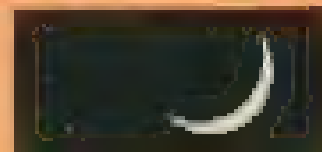


THEN THE SUN CAN SHINE ON THE SIDE OF THE MOON WHICH IS TOWARDS US AND WE SEE A FULL MOON.

ANOTHER TWO WEEKS AND THE THREE BODIES ARE AGAIN IN THE FIRST POSITION. IN BETWEEN, SOME BUT NOT ALL OF THE MOON'S LIGHTED SIDE IS TURNED TOWARDS US AND WE SEE THE MOON BECOMING EITHER FULLER AND FULLER OR THINNER AND THINNER.

SO EVEN THOUGH ONE HALF OF THE MOON IS ALWAYS LIGHTED BY THE SUN, WE CAN SEE THE FULL LIGHTED SIDE OF THE MOON ONLY ONCE A MONTH. THE REST OF THE TIME WE CAN SEE ONLY PARTS OF THE LIGHTED SIDE AND AT NIGHT MOON WE CAN'T SEE IT AT ALL.

IF WE WERE WATCHING OUR EARTH FROM THE MOON WE WOULD SEE OUR EARTH TOO IN THE SAME SHAPES AND SIZES.



(PHASES OF THE MOON)



The race to the moon

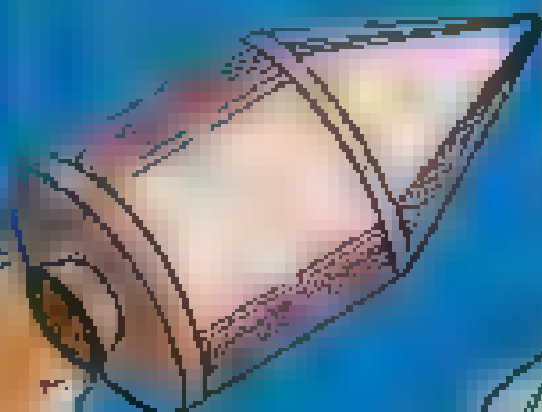
Script: J.D. Moore

Illustrations: André Mendy

THE FIRST EVER SPACECRAFT
TO BE LAUNCHED WAS THE
RUSSIAN SATELLITE SPUTNIK 1.
IT WAS LAUNCHED ON
OCTOBER 4, 1957.



LAUNCHING THE FIRST
SPACECRAFT TO GO INTO
THE MOON, IT WAS LAUNCHED
BY SOVIET SPACE SCIENTISTS
ON JANUARY 2, 1959.



IT WAS LAUNCHED ON
SEPTEMBER 12, 1968
WAS THE FIRST
SPACECRAFT TO GO TO
THE MOON.

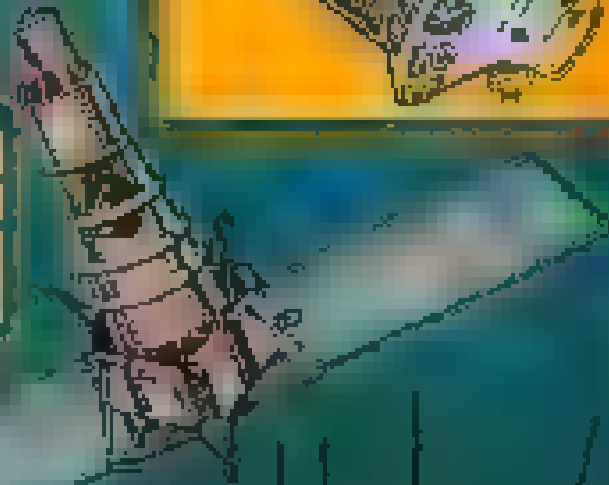




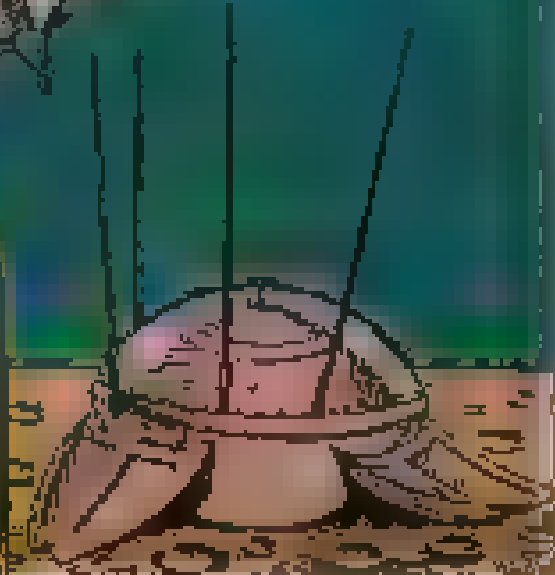
WHICH WAS LAUNCHED ON OCTOBER 4, 1958 THE SPUTNIK 1 TOOK PHOTOGRAPHS OF THE FAR SIDE OF THE MOON WHICH HAD NEVER BEEN SEEN BEFORE THIS IS BECAUSE THE MOON ALWAYS HAS THE SAME SIDE TURNED TOWARDS THE EARTH



AMERICAN ATTEMPTS TO REACH THE MOON WERE NOT SUCCESSFUL UNTIL JULY 1969 WHEN A SPACECRAFT SENT BACK DETAILS SHOWING IT CRASHED ON THE MOON



BOTH RUSSIA AND AMERICA TRIED TO SEND A SPACECRAFT THAT WOULD NOT CRASH, BUT GOT STUCK IN THE MOON IN 1966 THE AMERICANS GOT STUCK IN LEAVING A CROOKED ANTENNA ON THE MOON THE SPUTNIK 1499 SENT BACK THE FIRST CLOSE UP PICTURE OF THE MOON'S SURFACE



WITH A LONG MARCH, THE
AMERICAN LEFT BEHIND
A REMINDER OF HIS PRESENCE ON
THE MOON



AS THE AMERICAN LEFT BEHIND
THE MOON, THE AMERICAN
LEFT A REMINDER OF HIS PRESENCE
ON THE MOON. THE AMERICAN
LEFT A REMINDER OF HIS PRESENCE
ON THE MOON. THE AMERICAN
LEFT A REMINDER OF HIS PRESENCE
ON THE MOON. THE AMERICAN
LEFT A REMINDER OF HIS PRESENCE
ON THE MOON.

WHEN THE AMERICAN WERE THE FIRST TO ALIGHT ON THE MOON
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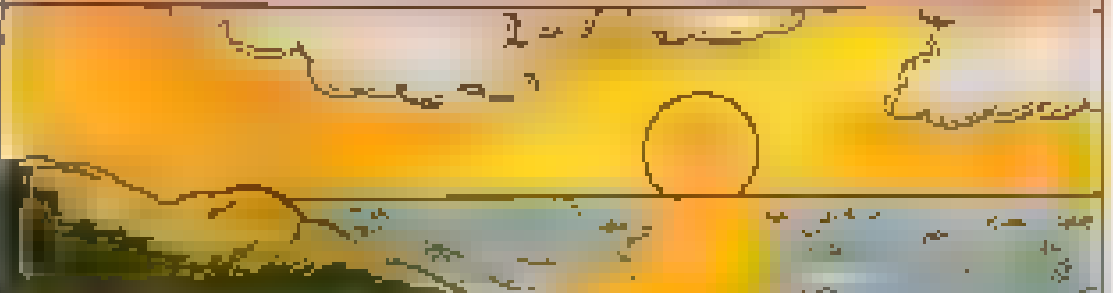
YOU CAN SEE OTHER STARS AT NIGHT...



...BUT IN THE DAYTIME THE ONLY STAR YOU CAN SEE IS THE SUN.



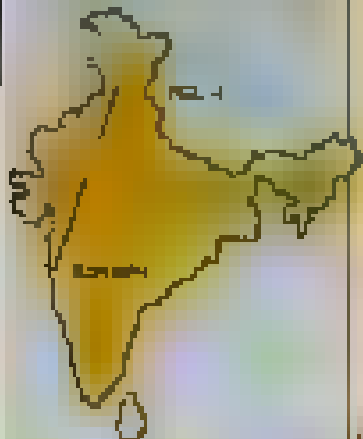
IF THE SUN IS A STAR WHY DOESN'T IT LOOK LIKE OTHER STARS? WHY DOES IT LOOK LIKE A HUGE RED BALL? THE SUN LOOKS DIFFERENT FROM OTHER STARS BECAUSE IT IS MILLIONS OF TIMES CLOSER TO EARTH THAN ANY OTHER STAR. IF OUR SUN WERE AS FAR AWAY AS THE OTHER STARS, IT TOO, WOULD HAVE APPEARED TO US AS A TWINKLING SPOT IN THE SKY.



AFTER THE SUN THE NEXT CLOSEST STAR IS APPROXIMATELY 40 TRILLION MILES AWAY.



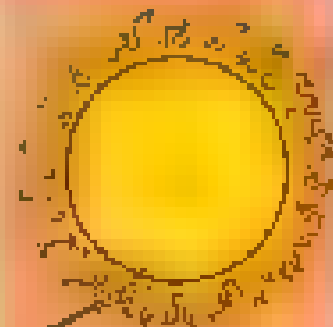
IF THE RAILROAD EXPRESS WERE TO TRAVEL NON STOP AT A SPEED OF 120 M.P.H. FOR ONE HOUR THE IT WOULD COVER THE DISTANCE BETWEEN BOMBAY AND DELHI.



IF IT WERE POSSIBLE TO LAY A RAIL BETWEEN THE EARTH AND THE NEAREST BODY THE SAME TRAIN TRAVELLING AT THE SAME SPEED WOULD TAKE 12 MONTHS TO REACH THE MOON.

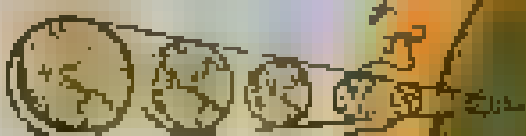


AND ABOUT 120 YEARS TO REACH THE SUN.

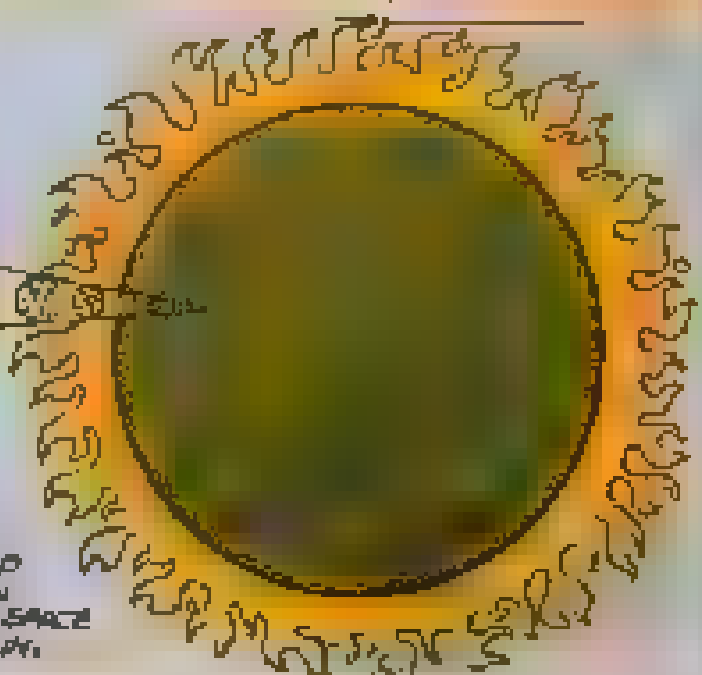


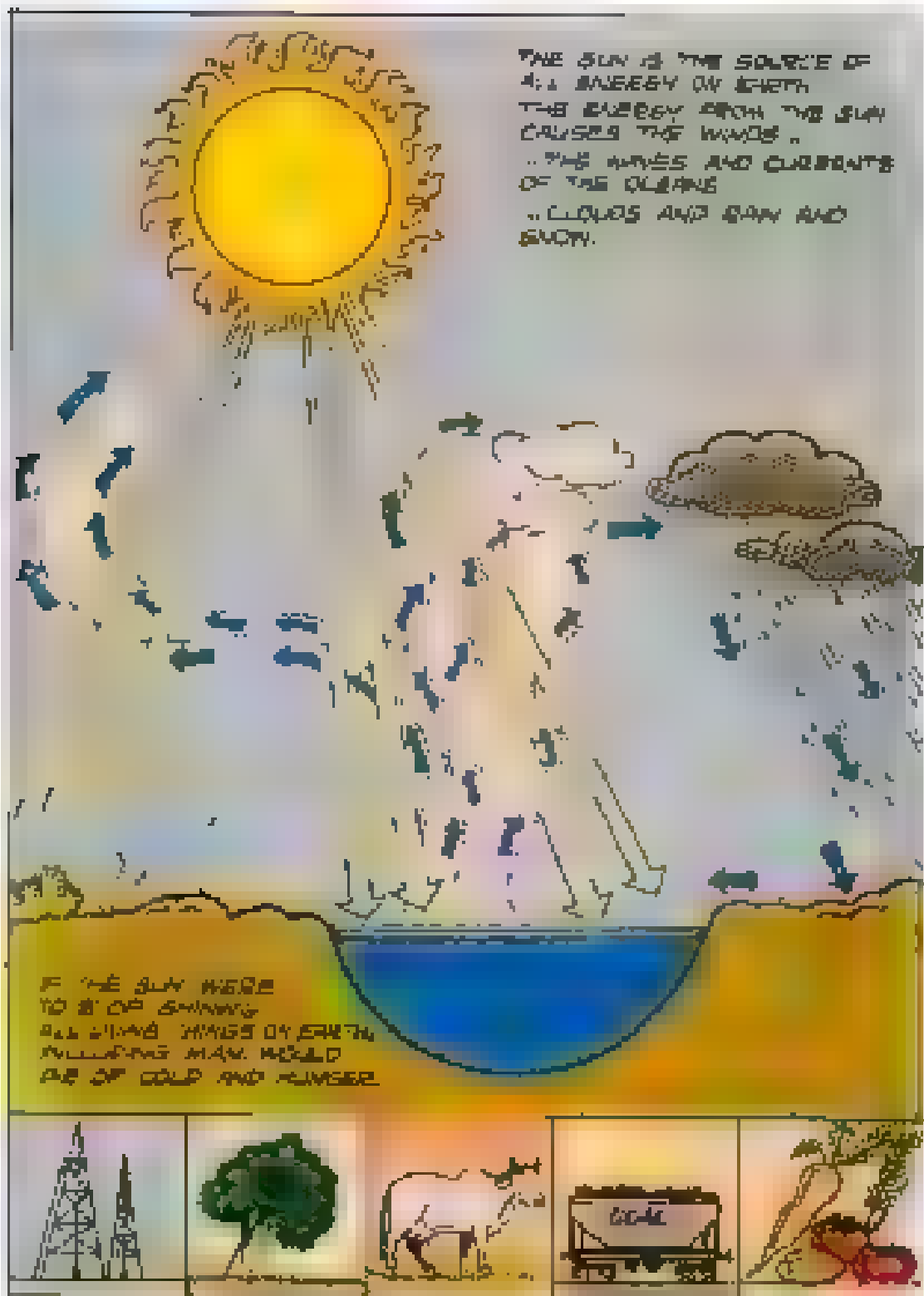
AND 2,400,000 YEARS TO REACH PROxima CENTAURI. SO YOU CAN SEE HOW FAR THE SUN IS AND HOW MUCH FURTHER THE NEXT NEAREST STAR IS.

LIKE ALL OTHER STARS THE SUN TOO, IS A BALL OF GAS.



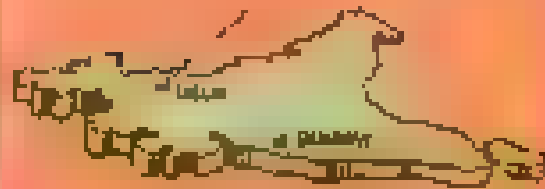
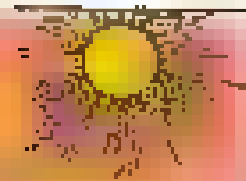
THERE ARE SEVERAL STARS BIGGER THAN OUR SUN BUT COMPARED TO THE EARTH, THE SUN HAS A VERY GREAT SIZE IT WOULD TAKE OVER A MILLION EARTHS TO FILL THE SPACE OCCUPIED BY THE SUN.





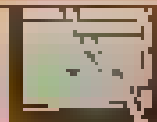


IT IS VERY HOT
IN JULY.

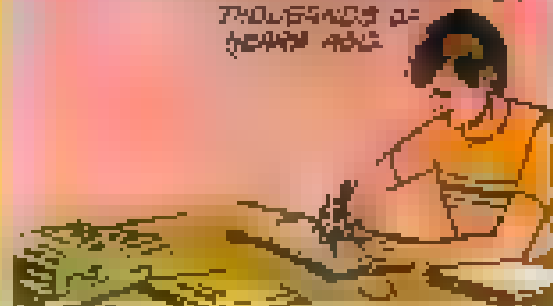


THE TEMPERATURE AT THIS TIME IS
BETWEEN 35°C TO 40°C

YOU CAN IMAGINE HOW
HOT IT MUST BE WHEN
THE TEMPERATURE
IS 3500°C. THAT IS
THE TEMPERATURE AT
THE OUTSIDE OF THE
SUN. THE OUTSIDE
IS NOT HOT AS
WE'VE COMING FROM
HERE BECAUSE THE
SUN THE
TEMPERATURE AT
THE CENTRE OF THE
SUN IS 15,000,000°C



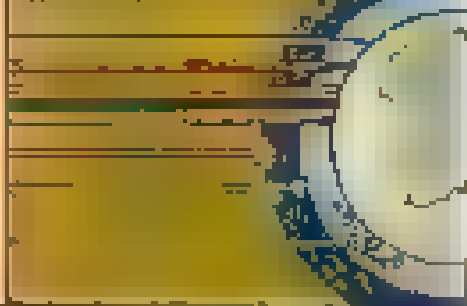
YOU MAY NOT BELIEVE IT,
BUT THAT SUN SPOT
COMING IN THROUGH YOUR
WALLS WAS FORMED IN
THE CENTRE OF THE SUN
THOUSANDS OF
YEARS AGO.



IT TOOK SO LONG TO REACH THE EARTH
BECAUSE THAT A HARD TIME COMING TO
THE SURFACE OF THE SUN. THEY SWIMMING
AND BEING CAPTURED AND HAD TO GO BACK
AND TO THE SUN FOR 100,000 YEARS AND
CENTURES. THAT IS WHY IT TAKES SO LONG
TO THE SURFACE AND BACK TO THE EARTH.
IT TOOK ABOUT 800,000 YEARS TO TRAVEL
THE DISTANCE BETWEEN THE SURFACE OF
THE SUN AND THE EARTH.



BEFORE THAT THE SUN WAS
A BOMB EXPLOSION AND THE
FOURTH SUN FOR 100,000
YEARS. THAT IS WHY A
PART OF THE SUN SPOT COMING
THE EARTH BECAUSE THERE
DANGEROUS AND WE
PREVENT THEM FROM
REACHING US.





DISPERSED ON THE SUN FOR ABOUT THE EARLY 100. ON 15TH NOVEMBER 1961 THERE WAS A GREAT EXPLOSION ON THE SUN. SIX HOURS AFTER A GIGANTIC CLOUD OF MAGNETIC GAS CLAYED OUT FROM THE SUN, COLLIDED WITH THE EARTH AT A SPEED OF ABOUT 800 KM A SECOND.

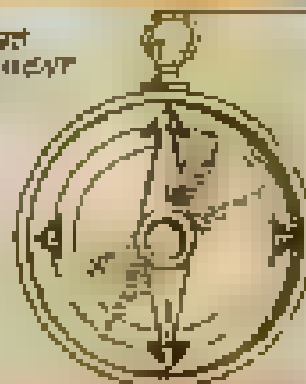


FOR HOURS ALL LOVS DISTANCE
FIND COMMUNICATIONS WERE
BLACKED OUT.

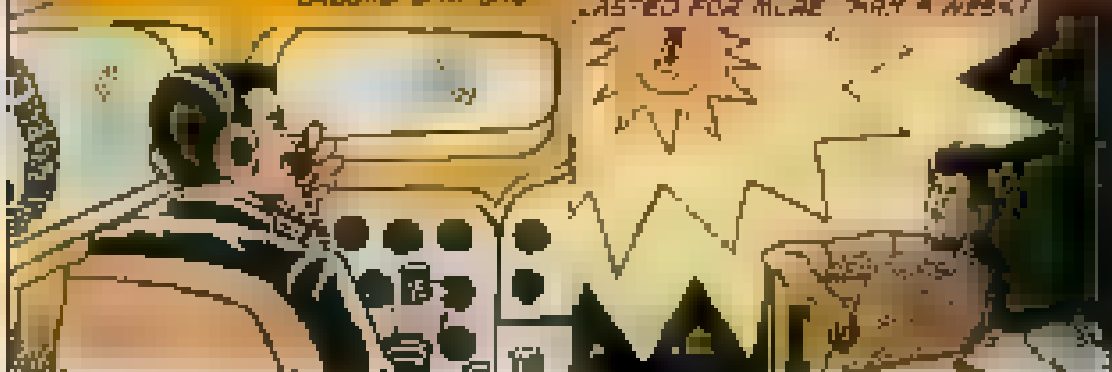


REALLY THE
ALL TO LOVE
CONTRACT IN THE
GROUND STATION

COMPARISON
NEEDLES WENT
WILD



IN SOME PARTS OF THE WORLD BLASTED
LIGHTS FLICKERED AS IF A FLASH
BUT THE SUN WAS NOT FLARE
AND EVEN SOME OF THE PS WORTHLES
LASTED FOR MORE THAN A WEEK!





SHIVAGO WAS A BRITISH MAN WHO WORKED THE NIGHT SHIFT AT A CHEMISTRY



HE LOVED ASTRONOMY. HE WANTED TO STUDY THE MOON AND THE STARS, BUT YOU CANNOT SEE THE MOON AND THE STARS DURING THE DAY AND THAT WAS THE ONLY TIME HE WAS FREE, SO HE STARTED STUDYING IN HIS YARD.



AN INTERESTING FEATURE ABOUT THE SUN IS SUNSPOTS. THERE ARE DARK SPOTS WHICH APPEAR ON THE SURFACE OF THE SUN AND MOVE AROUND. AFTER SEVERAL DAYS THESE SPOTS ARE ACTUALLY REAPPEAR WHERE THE SUN'S SURFACE IS SLIGHTLY COOLER THAN NORMAL, ABOUT 4000°C INSTEAD OF 6000°C.



BEHARRE STARTED
 STUDYING THESE SUBJECTS
 HE LEARNED THAT THE
 MAIN SUBJECTS HE SAW
 EVERY TIME HE LOOKED AT
 THE SUN
 LIVING THINGS HEARD HE
 SAW THEM WITH HIS EYES. THINGS
 OTHERS HE SAW BEHIND
 HIS EYES THAT THE
 GREAT GOD WANTED OF
 HIM TO BE SEEN
 EVERY FUTURE VISION
 TO BE SEEN AND OF
 GREAT IMPORTANCE TO
 HIS FUTURE



HE LEARNED SOMETHING & WISHED TO
 KNOW MORE ABOUT IT - THE
 SUN WAS THE GREAT GOD
 WHO WAS



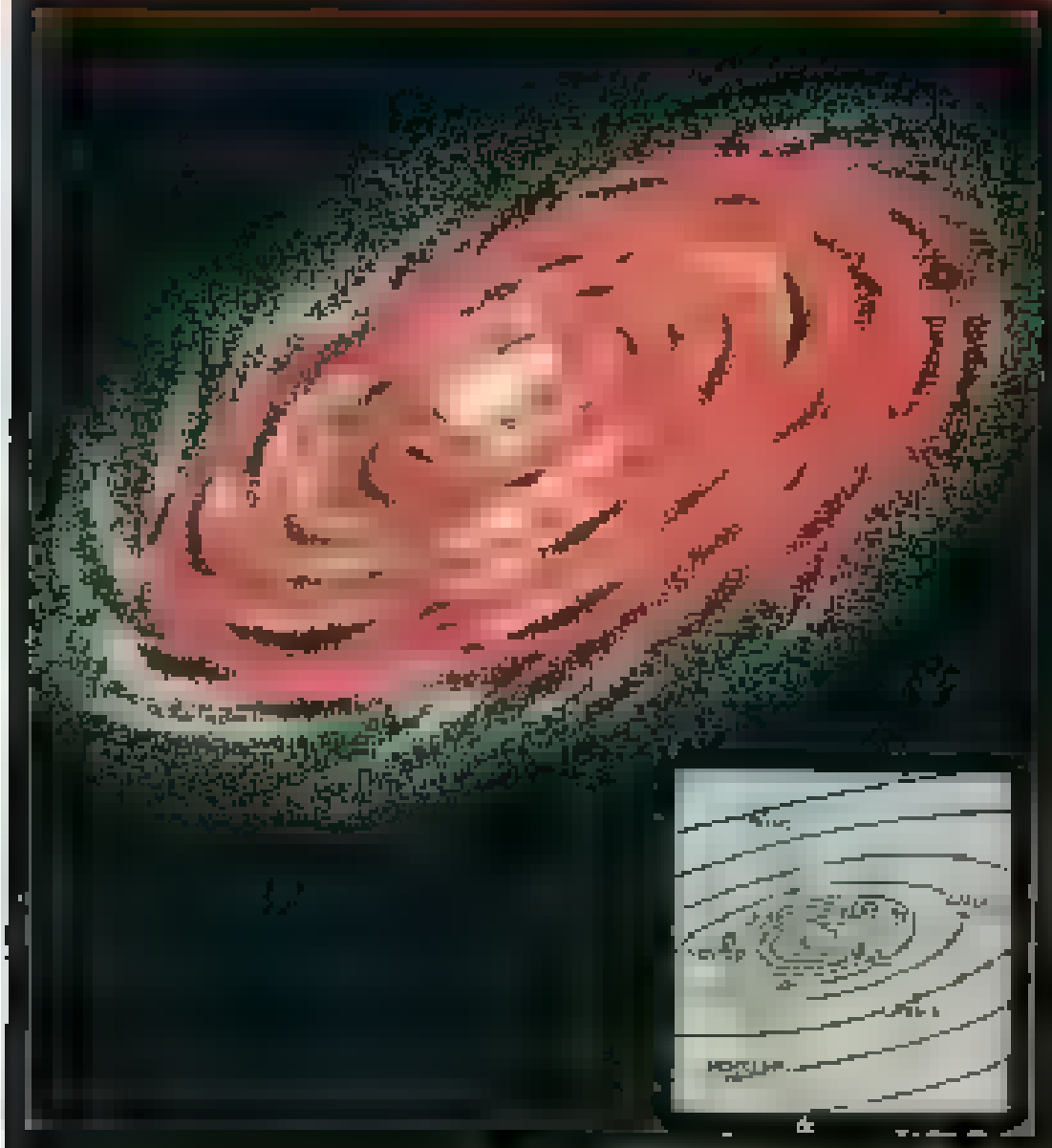
HE LEARNED SOMETHING & WISHED TO
 KNOW MORE ABOUT IT - THE
 SUN WAS THE GREAT GOD
 WHO WAS



OUR SOLAR SYSTEM-1

Script: J.D. Meier
Illustrations:
Anand Mehta

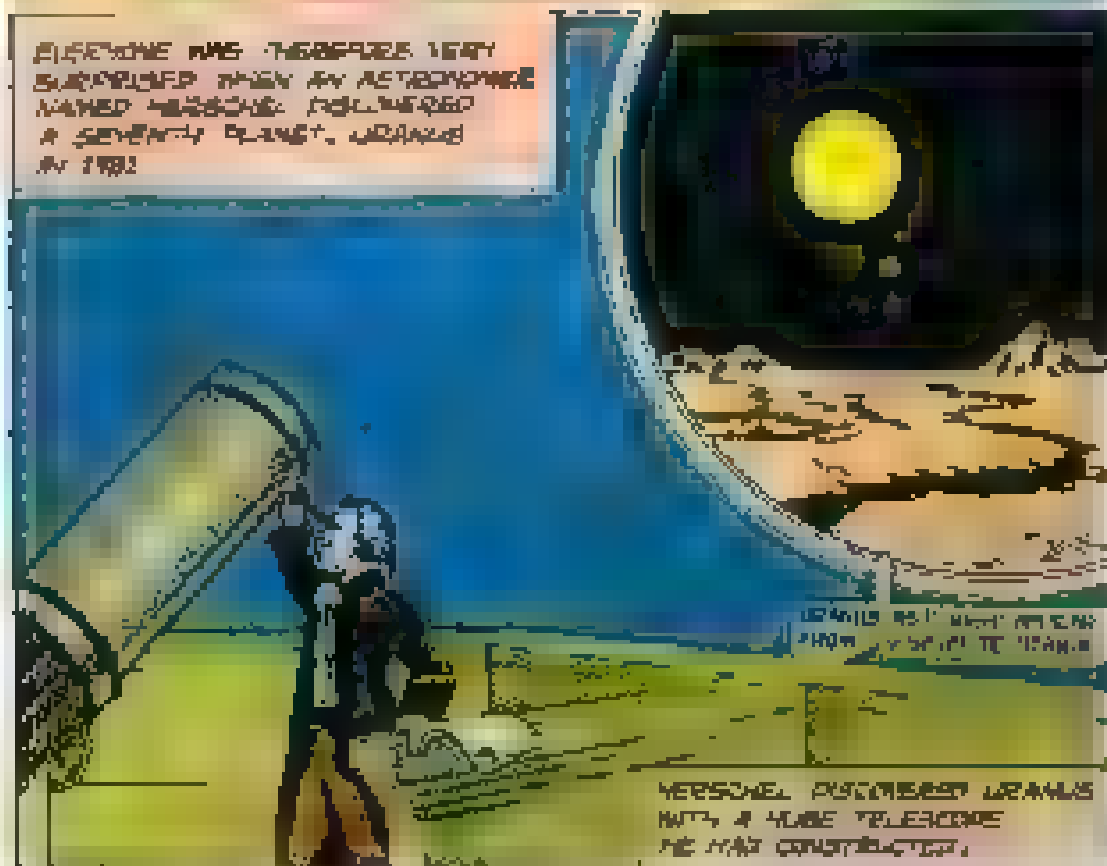
THERE ARE MANY MANY GALAXIES IN THE UNIVERSE.
ONE OF THEM WE CALL THE MILKY WAY.
THE MILKY WAY IS MADE UP OF COUNTLESS STARS
AT ITS CENTER, THE STARS ARE PACKED CLOSELY TOGETHER
BUT THE STARS BECOME SPACED TOWARDS THE EDGE. NO MATTER HOW FAR
THE CENTER THERE IS AN ORANGE-YELLOW STAR. THIS STAR IS OUR SUN
AROUND WHICH OUR EARTH AND THE OTHER PLANETS REVOLVE.



THE PLANETS CAN BE SEEN WITH THE NAKED EYE
SO IN ANCIENT TIMES AND EVEN AS
LATE AS THE 18TH CENTURY PEOPLE
THOUGHT THERE WERE ONLY FIVE
OTHER PLANETS BESIDES EARTH



EVERYONE WAS THEREFORE VERY
SURPRISED WHEN AN ASTRONOMER
NAMED HERSCHEL DISCOVERED
A SEVENTH PLANET, URANUS
IN 1781



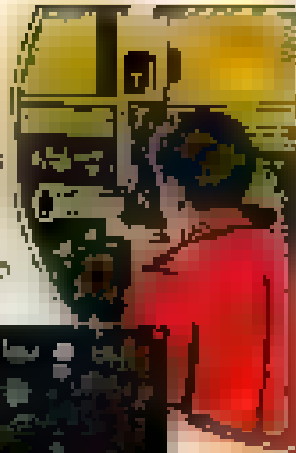
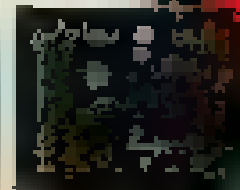
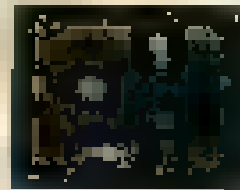
URANUS WAS FIRST OBSERVED
FROM YORP OBTAINING

HERSCHEL DISCOVERED URANUS
WITH A HUGE TELESCOPE
HE HAD CONSTRUCTED.

BUT ANOTHER PLANET
 WAS DISCOVERED IN 1846.
 IT WAS NAMED
 NEPTUNE.



IN 1846 A YOUNG ASTRONOMER
 NAMED JOSEPH TELESCOPIC
 DISCOVERED A PLANET
 WHICH IT WAS NAMED PLUTO.
 LATER TELESCOPIC FOUND
 PLUTO BY STARRYING THOUSANDS
 OF PHOTOGRAPHS OF THE
 REGION OF THE SKY IN WHICH
 OTHER ASTRONOMERS HAD
 EXPECTED THAT PLUTO WOULD
 BE FOUND.



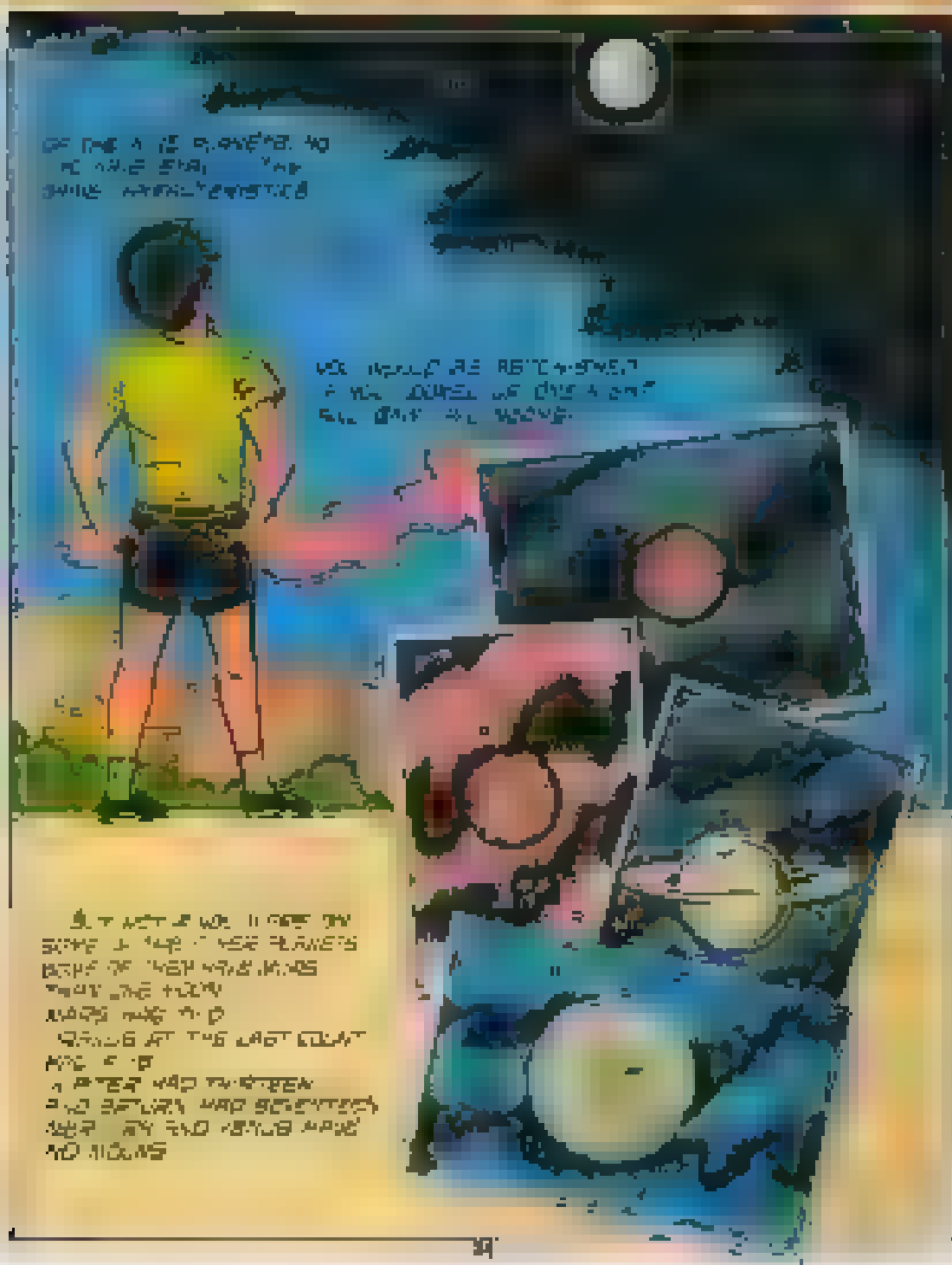
THE PLANETS

NAME IN ENGLISH	NAME IN HINDI	YEAR OF DISCOVERY -
MERCURY	BUDHA	ANCIENT
VENUS	SHUKRA	ANCIENT
EARTH	SHUKRANOL PRITHVI	ANCIENT
MARS	MAANGALA	ANCIENT
JUPITER	SHUKRA BHOORAVAT	ANCIENT
SATURN	SHANI	ANCIENT
URANUS		1781
NEPTUNE		1846
PLUTO		1930

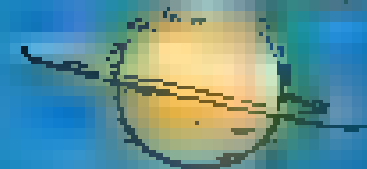
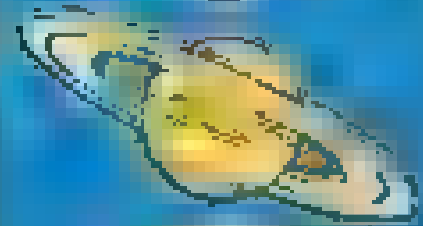
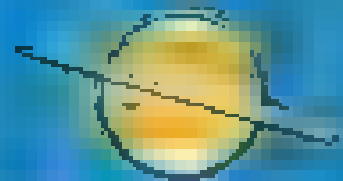
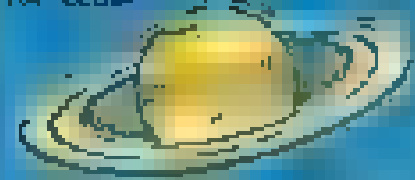


OUR SOLAR SYSTEM—2

SCIENCE 101
 UNIT: PLANETS
 Annual Review

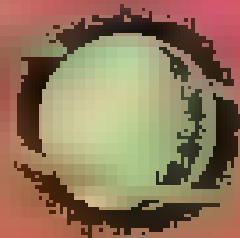


SCIENTISTS ARE SEARCHING FOR EVIDENCE
OF THE RINGS OF THE PLANETS
JUPITER, SATURN, AND URANUS.

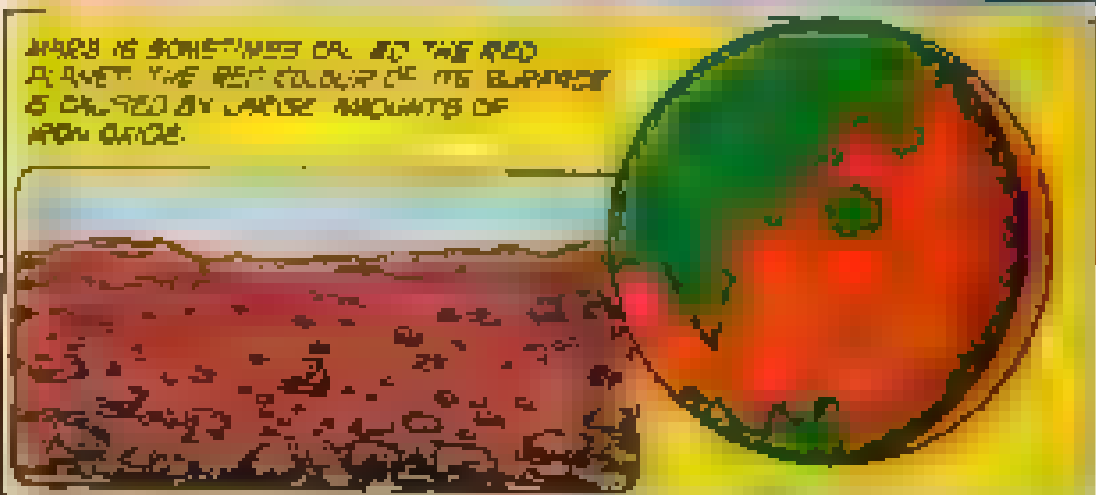
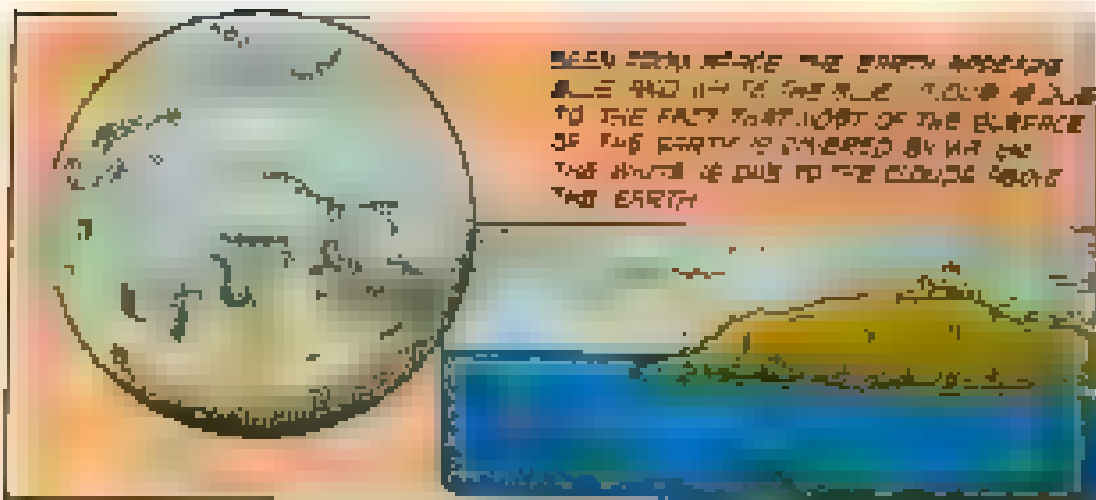


THE RINGS OF THE PLANETS ARE MADE OF ICE AND ROCK.

THE RINGS OF THE PLANETS ARE MADE OF ICE AND ROCK.

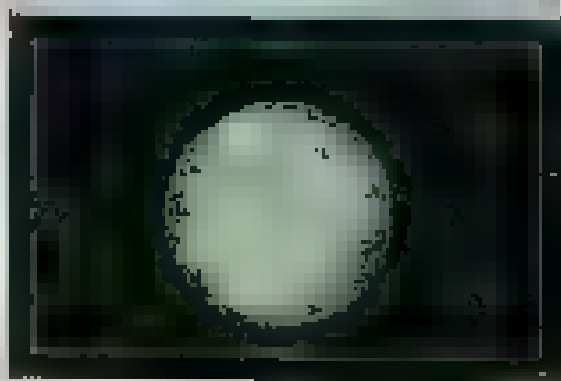
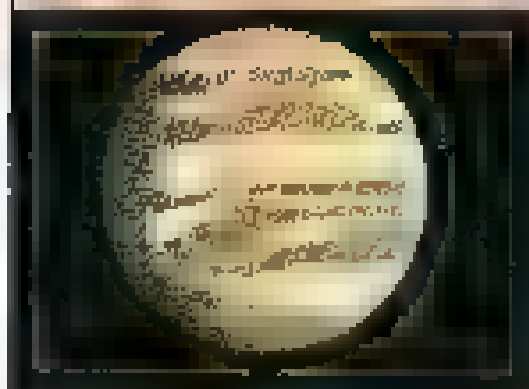


13



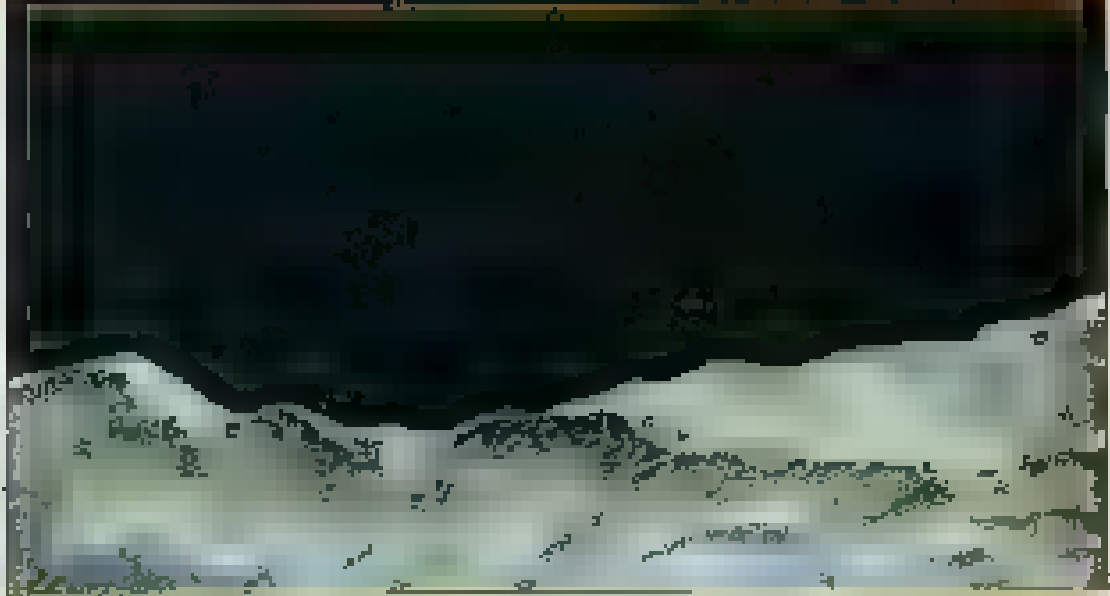
MARS HAS A GREAT RED SPOT.
 THE RED SPOT IS A PERMANENTLY
 BURNING SWIRL OF CLOUD.

MARS AND JUPITER ARE ENOUGH
 IN COLOR
 IT IS BELIEVED THAT BOTH PLANETS
 HAVE ROCKY CENTERS COVERED WITH ICE



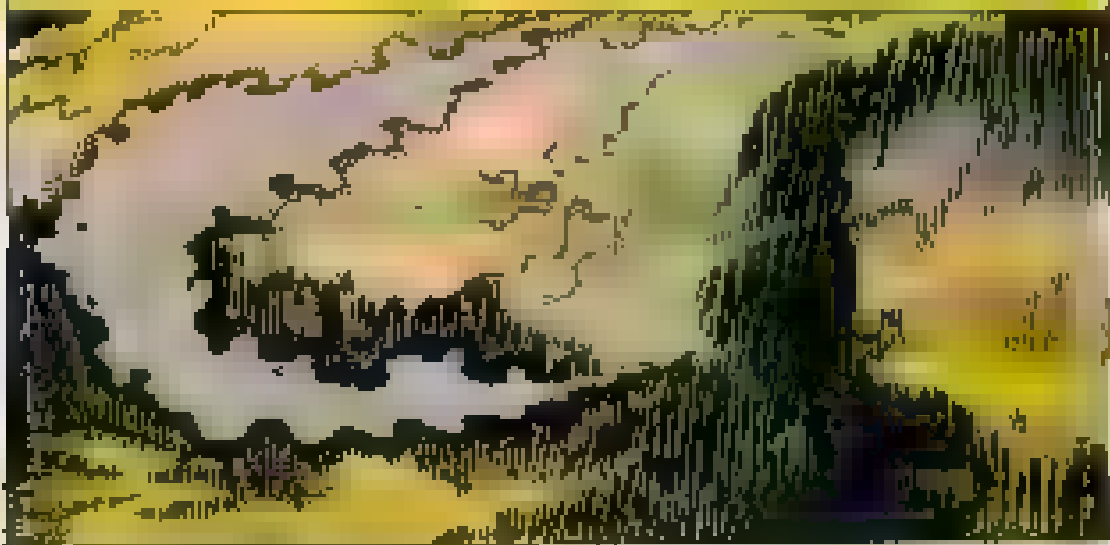
THE COLDEST

PLUTO BEING FARTHEST FROM THE SUN IS THE COLDEST PLANET. IT IS SO COLD THAT NOT ONE OF THE KING BE BRIDGES WOULD WANT TO GO AND LIVE THERE.



AND THE HOTTEST

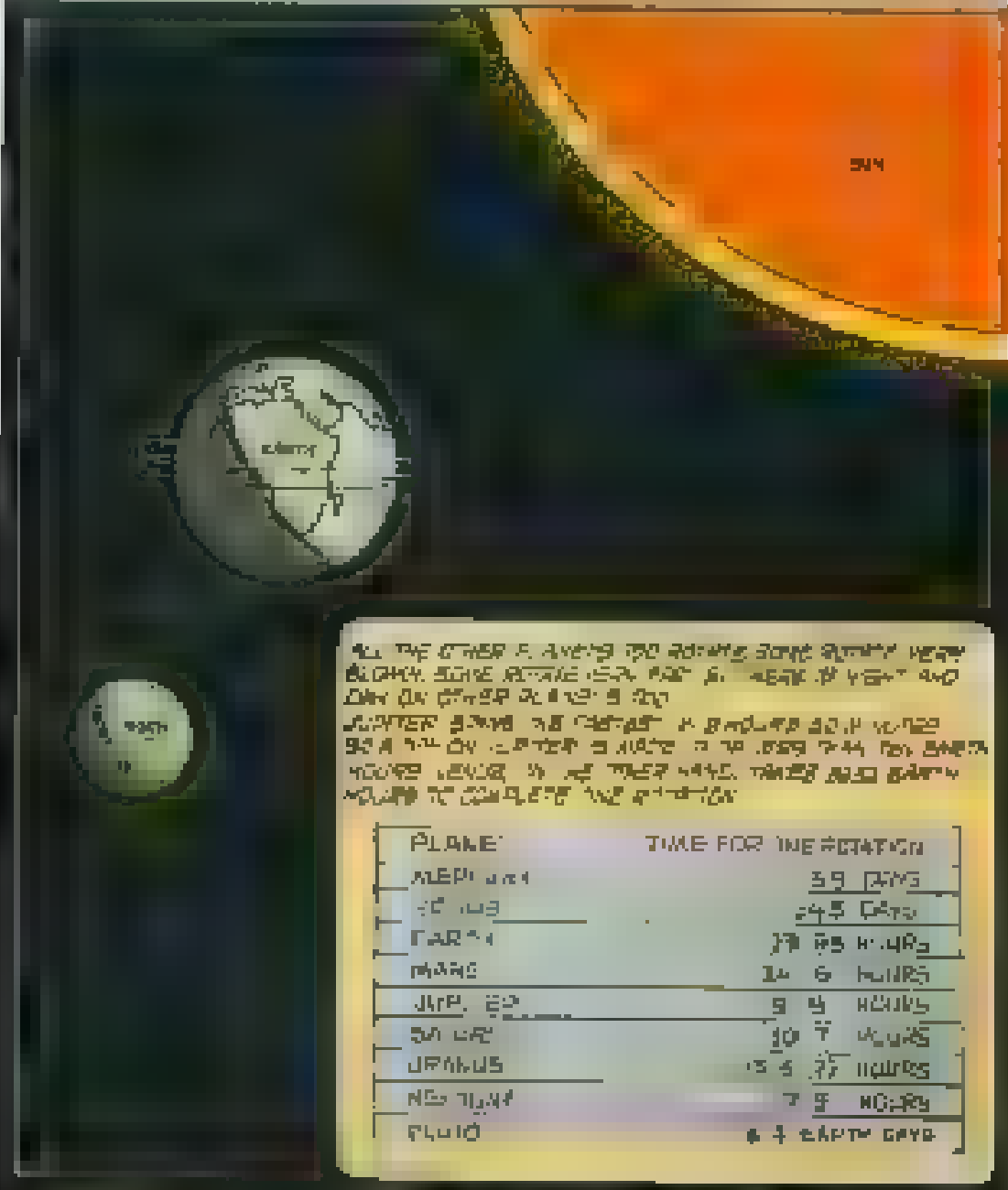
VENUS IS CLOSEST TO THE SUN BUT IT IS NOT THE HOTTEST PLANET. THE HOTTEST IS MERCURY. VENUS HAS THICK CLOUDS AROUND IT AND THESE CLOUDS PREVENT HEAT FROM ESCAPING FROM THE SURFACE. THE SURFACE TEMPERATURE ON MERCURY IS OVER 100°C. HOT ENOUGH TO MELT LEAD!



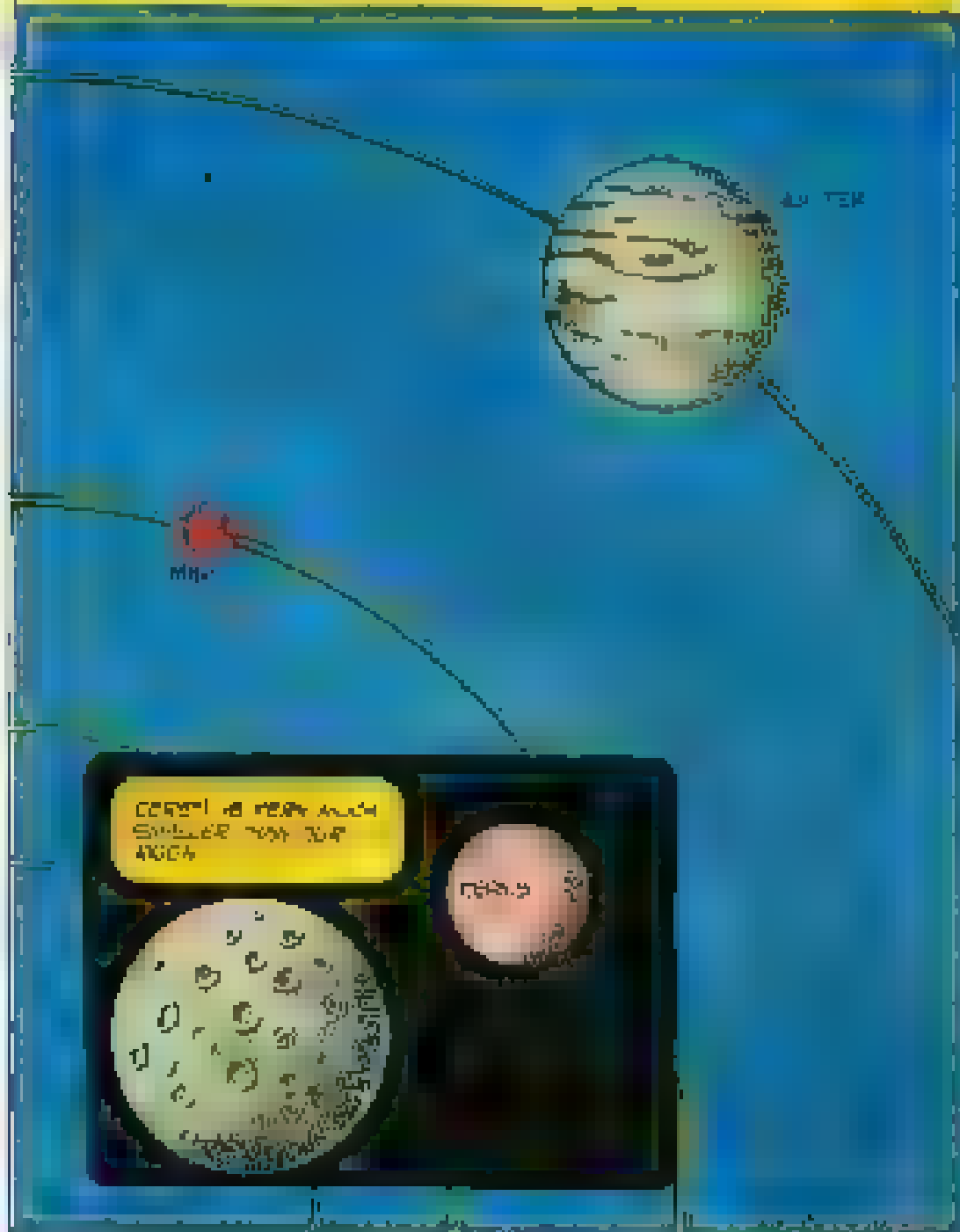
OUR SOLAR SYSTEM—3

Barbara J. O. Ingham
Illustrations
Anand Manda

THE EARTH SPINNS UP A TOP YOUTHER WORTHS, IT ROTATES
AS IT SPINNS, WE ARE TURNING TOWARDS THE SUN. IT LIGHTS UP HALF THE GLOBE ON THE
OTHER SIDE IS DARK
IT IS BECAUSE THE EARTH SPINNS THAT WE HAVE DAY AND NIGHT



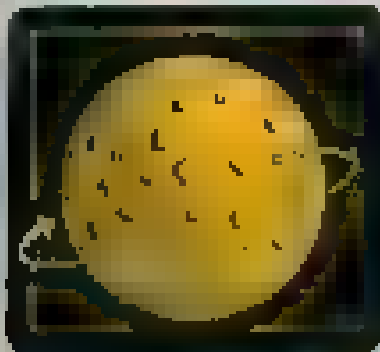
BETWEEN MARS AND JUPITER THERE ARE THOUSANDS OF MINOR PLANETS.
 THEY ARE ALL PLANNED TO BE AS BIG AS
 SOME OF THEM ARE AS BIGGER THAN MARS. THERE ARE LARGER.
 THE LARGEST, CERES, IS ONLY ABOUT 100 MILES ACROSS.



MERCURY

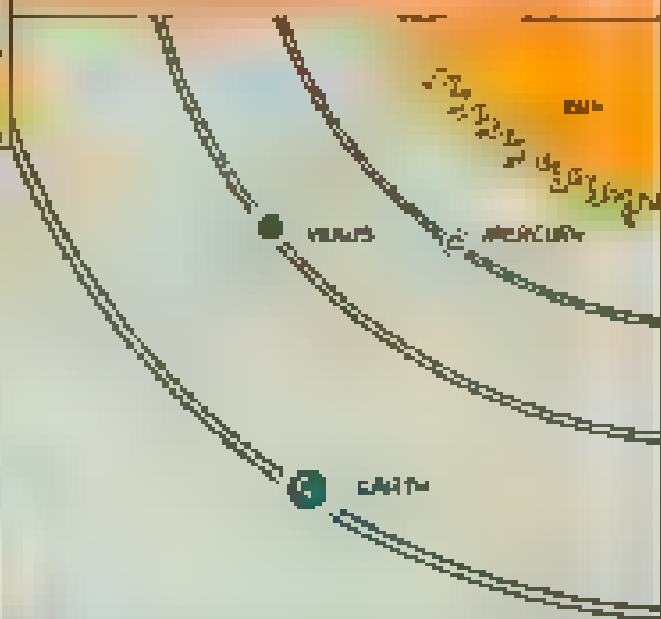
Series: J-D colour
Illustrations: Antoni Vicens

HERE MY RULER MARKS
THE ORBIT AROUND THE SUN
AT THE GREATEST SPEED OF
48 KM PER SECOND THE
NEED IN THIS RACE IS MERELY
WITH A SPEED OF 35 KM PER
SECOND. THE EARTH FOLLOWING
THIRD AT 30 KM PER SECOND.



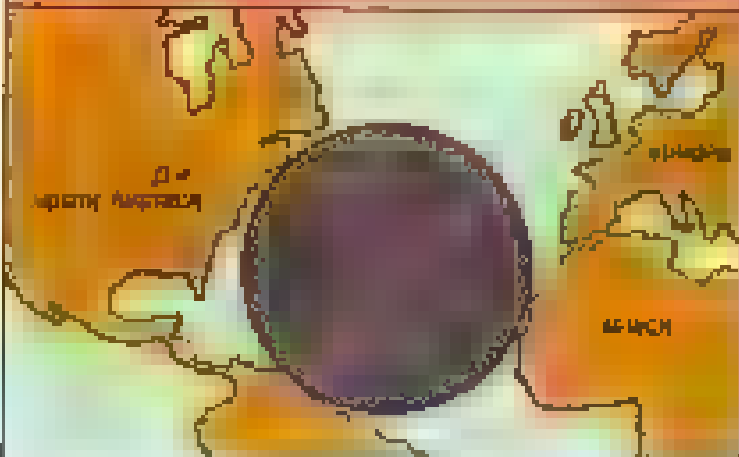
BUT APPROX. 60 KM 50M
IN THERE IS RELATED TO THE
AS IT IS 50% OF THE TOTAL
CAN BE CLOSE TO THE SUN IF
THAT IS 50% OF THE

MERCURY IS THE PLANET CLOSEST TO THE SUN IT IS
ALSO THE SMALLEST AND FASTEST MOVING PLANET
IN OUR SOLAR SYSTEM

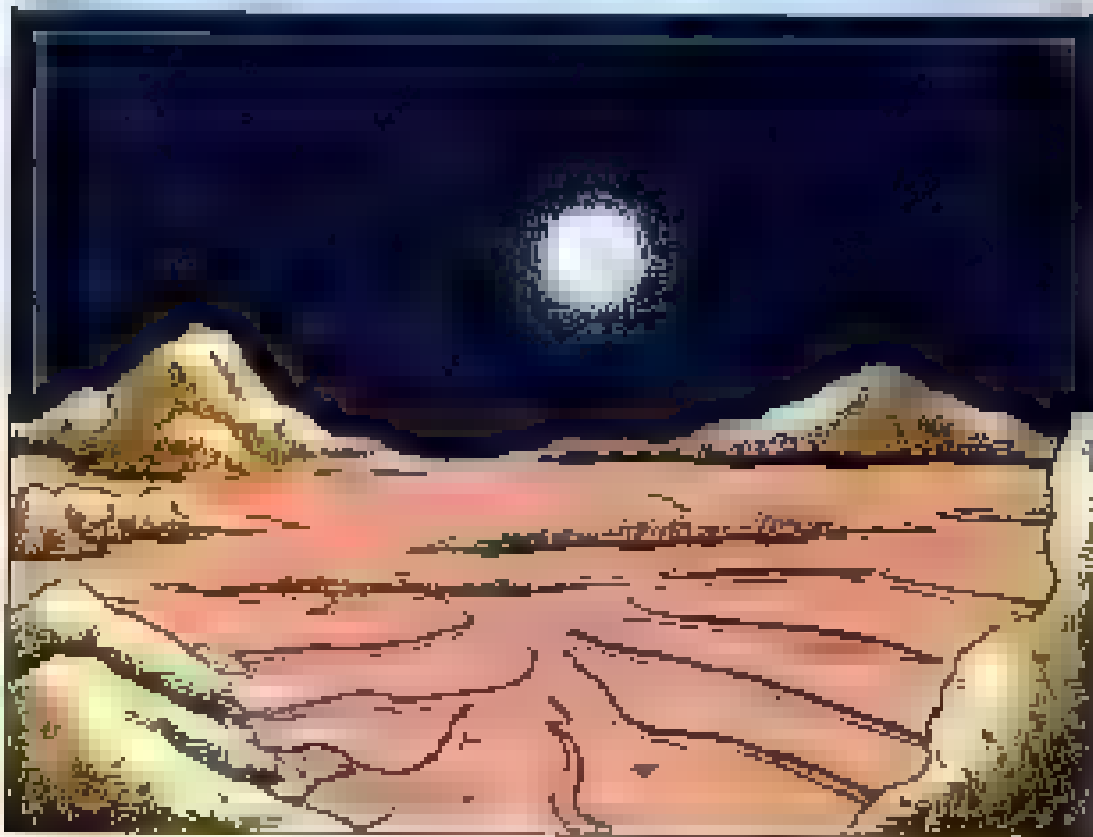


THE SUN IS STRENGTH AND THE SUN
NEEDS TO BE A TROPIC
NEEDS TO BE A TROPIC
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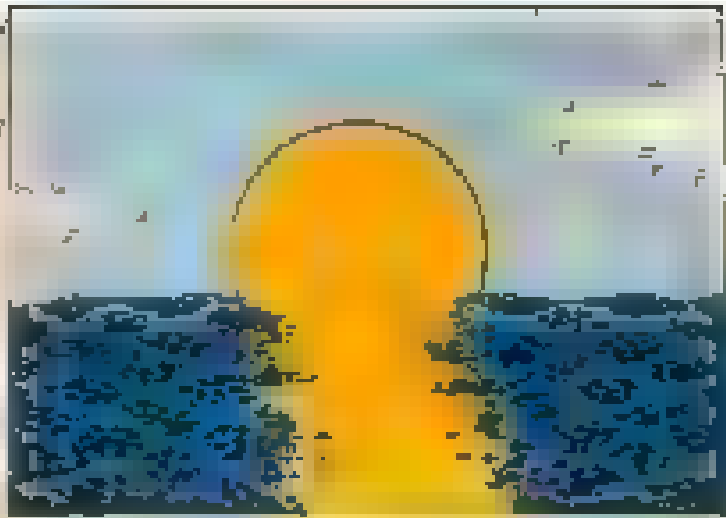
MERCURY IS ABOUT THE SIZE OF PLUTO, THE PLANET FARTHEST FROM THE SUN AND IS SLIGHTLY LARGER THAN OUR MOON. IT IS ABOUT 30 TIMES SMALLER THAN EARTH. IT IS THE ONLY PLANET IN THE SOLAR SYSTEM WHERE IT IS NEARLY ALWAYS IN THE SHADOW OF THE EARTH.



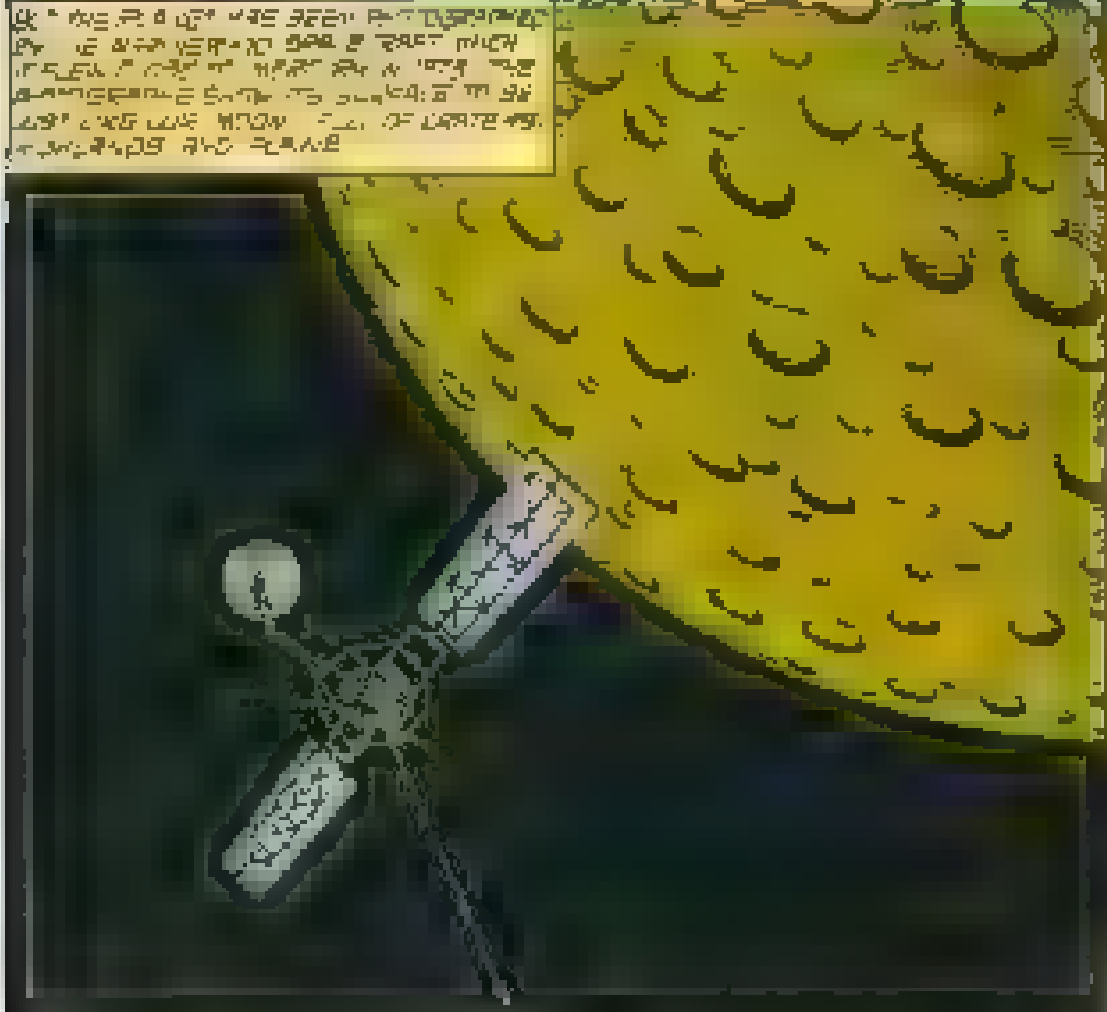
BEING CLOSEST TO THE SUN, MERCURY RECEIVES MAXIMUM HEAT AND LIGHT AND THE SUN ALWAYS APPEARS BIGGER ON MERCURY THAN IT DOES TO US ON EARTH. THE SUN SHINES PERFECTLY BECAUSE MERCURY HAS NO ATMOSPHERE AND ITS ONLY TEMPERATURE IS AS HIGH AS 400°F AT NOON. THE TEMPERATURES DROP TO 100°F AT NIGHT.



IT IS NOT EASY TO SEE MOUNTAINS
FROM FAR AWAY BECAUSE OF THE
SCATTERING OF THE SUN THE
LIGHT BECOMES VERY DIM
AND IT IS NOT EASY TO SEE
THE SURFACE EVEN
THROUGH A TELESCOPE AT
SUNRISE OR AT SUNSET



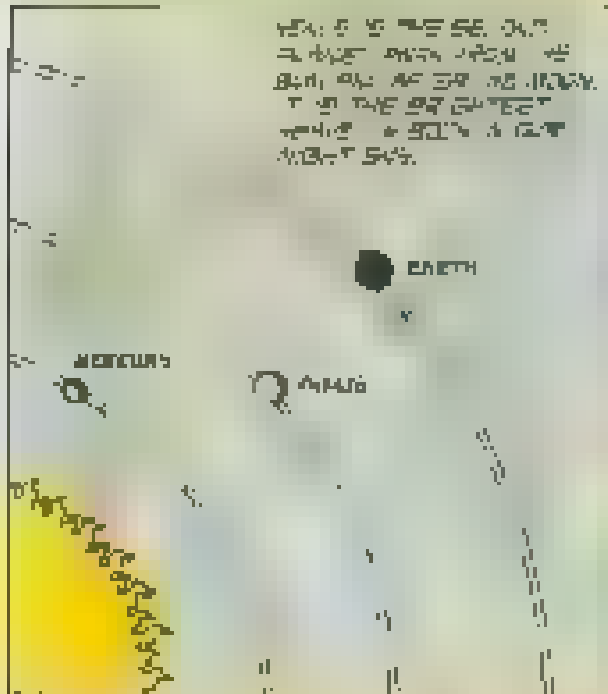
THE FIRST LIGHT HAS BEEN OBSERVED
BY THE NEW YORK OBSERVATORY
IN THE PAST FEW YEARS BY THE
AMERICAN OBSERVATORY IN THE
WEST AND LONG MOUNTAIN OF MOUNTAIN
IN THE PAST FEW YEARS



VENUS

Series
J. B. Linder
Illustrations
Kenny Martin

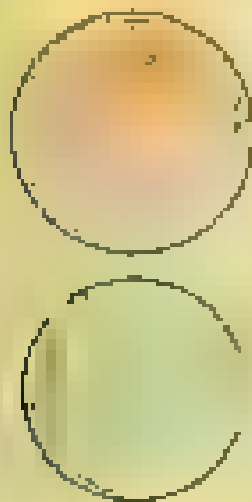
VENUS IS THE SECOND PLANET FROM THE SUN. IT IS THE ONLY PLANET IN THE SOLAR SYSTEM WITH A THICK ATMOSPHERE OF CARBON DIOXIDE AND SULFURIC ACID CLOUDS.



DETAILS OF THE ATMOSPHERE AND SURFACE OF VENUS HAVE BEEN REVEALED BY THE MESSENGER SPACECRAFT. IT IS THE ONLY PLANET IN THE SOLAR SYSTEM WITH A THICK ATMOSPHERE OF CARBON DIOXIDE AND SULFURIC ACID CLOUDS.



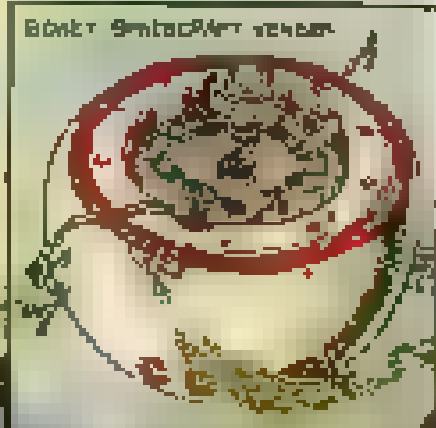
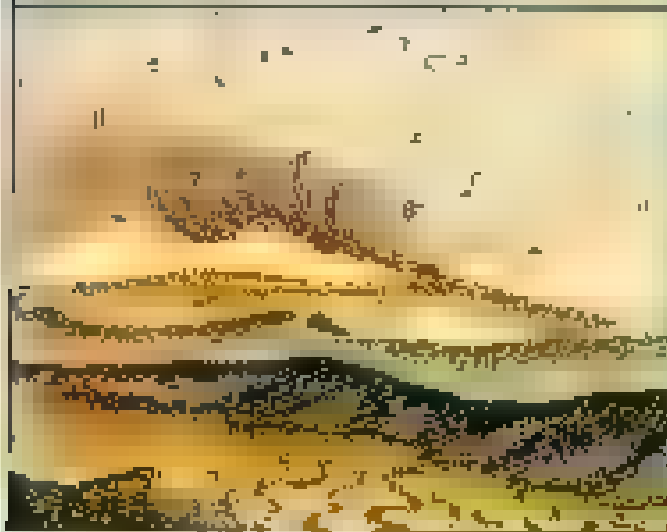
VENUS IS THE ONLY PLANET IN THE SOLAR SYSTEM WITH A THICK ATMOSPHERE OF CARBON DIOXIDE AND SULFURIC ACID CLOUDS. IT IS THE ONLY PLANET IN THE SOLAR SYSTEM WITH A THICK ATMOSPHERE OF CARBON DIOXIDE AND SULFURIC ACID CLOUDS.



VENUS IS THE ONLY PLANET IN THE SOLAR SYSTEM WITH A THICK ATMOSPHERE OF CARBON DIOXIDE AND SULFURIC ACID CLOUDS. IT IS THE ONLY PLANET IN THE SOLAR SYSTEM WITH A THICK ATMOSPHERE OF CARBON DIOXIDE AND SULFURIC ACID CLOUDS.



THE THERMAL OF HEAT IS NOT THAT HOT. IT IS ONLY WHEN SHUT OUT
 FROM THE HEAT OF THE SUN, BY THE AIR, THAT IT GETS HOT. THE HEAT OF THE
 SUN IS NOT HOT. IT IS ONLY WHEN SHUT OUT FROM THE HEAT OF THE SUN, BY THE
 AIR, THAT IT GETS HOT. THE HEAT OF THE SUN IS NOT HOT. IT IS ONLY WHEN SHUT OUT
 FROM THE HEAT OF THE SUN, BY THE AIR, THAT IT GETS HOT.



AFTER THE GLOBE IS SHOWN FROM THE SUN, THE SUN IS SHOWN FROM THE GLOBE.
 THE SUN IS SHOWN FROM THE GLOBE, AND THE GLOBE IS SHOWN FROM THE SUN.
 THE SUN IS SHOWN FROM THE GLOBE, AND THE GLOBE IS SHOWN FROM THE SUN.



THE GLOBE IS SHOWN FROM THE SUN, AND THE SUN IS SHOWN FROM THE GLOBE.
 THE GLOBE IS SHOWN FROM THE SUN, AND THE SUN IS SHOWN FROM THE GLOBE.
 THE GLOBE IS SHOWN FROM THE SUN, AND THE SUN IS SHOWN FROM THE GLOBE.

MARS

Script: J. D. LINDSEY
Illustrations: Arnold Mendel

THE FIRST STATION OF AMERICA
ESTABLISHED 1933



LADIES AND GENTLEMEN,
HAVE A SEAT. WE'VE
TOOK THE STATION
TO BE WITH YOU IN NEW
MEXICO. AND WE'VE
TOOK THE STATION
TO BE WITH YOU
IN NEW MEXICO.

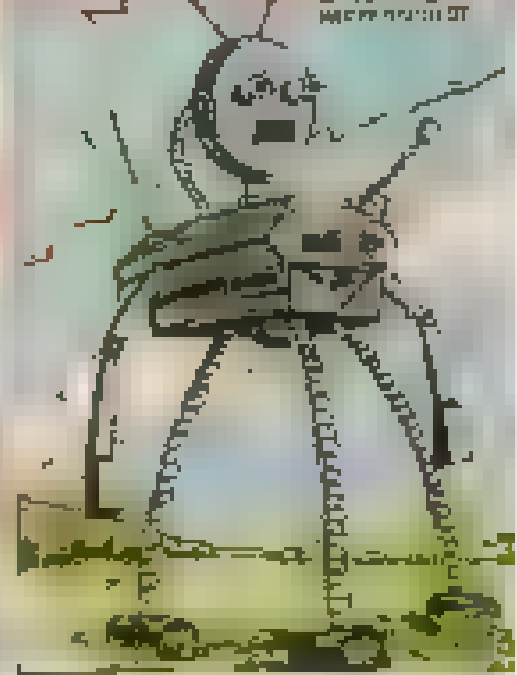


WHAT IS
THE STATION
WITH IT?

IT IS THE
STATION
WITH THE
STATION
WITH THE
STATION

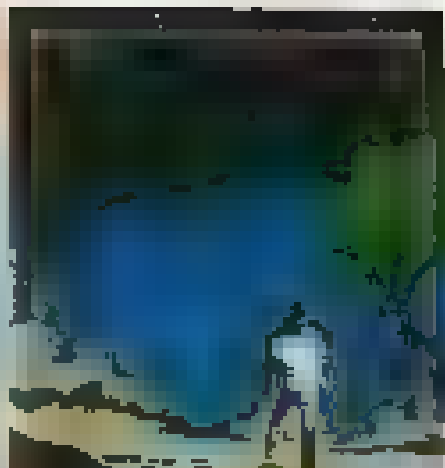
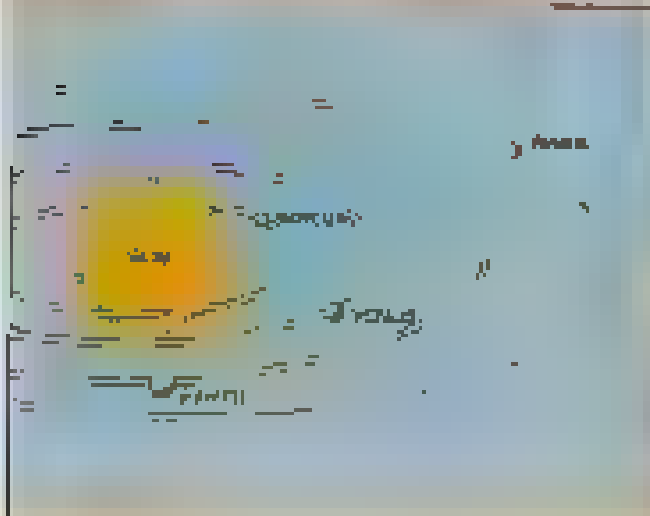
THE STATION
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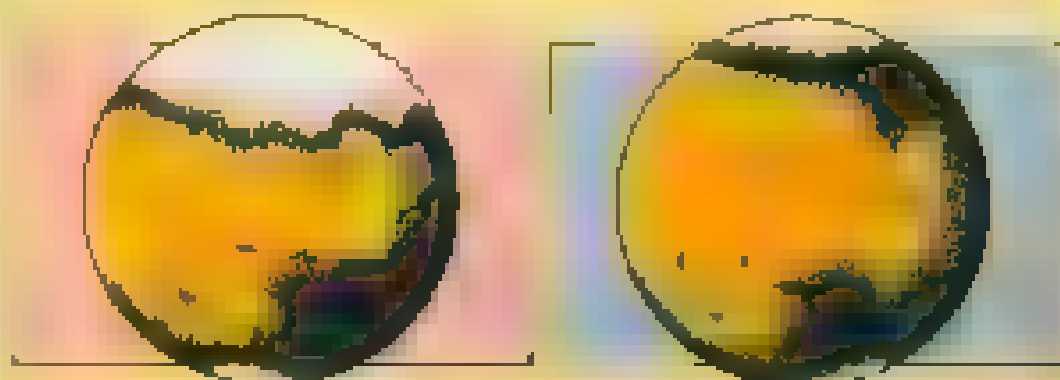
WATER IS THE MOST COMMON FORM OF LIFE
ON EARTH. IT IS THE MOST IMPORTANT
SUBSTANCE FOR ALL LIFE. IT IS THE MOST
ABUNDANT SUBSTANCE ON EARTH.



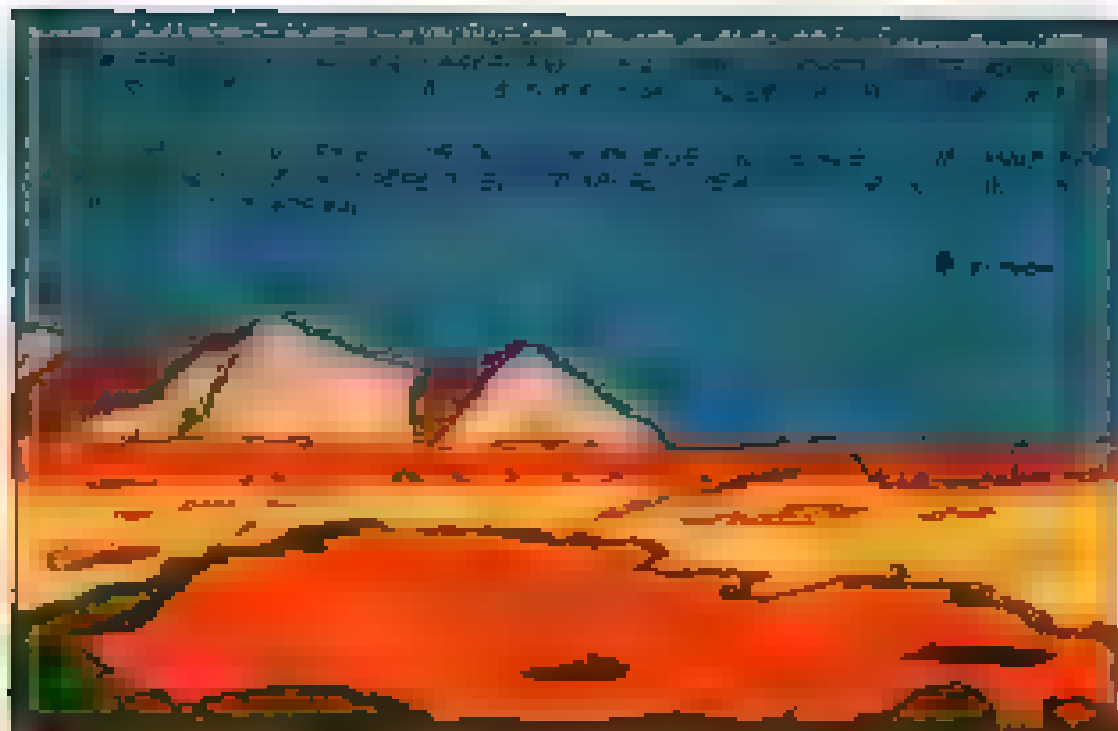
THE WATER IS THE MOST COMMON FORM OF LIFE
ON EARTH. IT IS THE MOST IMPORTANT
SUBSTANCE FOR ALL LIFE. IT IS THE MOST
ABUNDANT SUBSTANCE ON EARTH.

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THE WATER IS THE MOST COMMON FORM OF LIFE
ON EARTH. IT IS THE MOST IMPORTANT
SUBSTANCE FOR ALL LIFE. IT IS THE MOST
ABUNDANT SUBSTANCE ON EARTH.



הַיָּמִים הַלְלוּ אֶת ה' וְיִשְׁמְחוּ בְּהִלְלוֹתָיו
וְיִשְׂמְחוּ בְּהִלְלוֹתָיו וְיִשְׂמְחוּ בְּהִלְלוֹתָיו



וְיִשְׂמְחוּ בְּהִלְלוֹתָיו וְיִשְׂמְחוּ בְּהִלְלוֹתָיו
וְיִשְׂמְחוּ בְּהִלְלוֹתָיו וְיִשְׂמְחוּ בְּהִלְלוֹתָיו
וְיִשְׂמְחוּ בְּהִלְלוֹתָיו וְיִשְׂמְחוּ בְּהִלְלוֹתָיו
וְיִשְׂמְחוּ בְּהִלְלוֹתָיו וְיִשְׂמְחוּ בְּהִלְלוֹתָיו
וְיִשְׂמְחוּ בְּהִלְלוֹתָיו וְיִשְׂמְחוּ בְּהִלְלוֹתָיו
וְיִשְׂמְחוּ בְּהִלְלוֹתָיו וְיִשְׂמְחוּ בְּהִלְלוֹתָיו

ANSWER

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THE LARGE EMPTY SPACE BETWEEN MARS AND
JUPITER WAS POPULATED AS FOLLOWS: A NEW PLANET
WAS FIRST ASSUMED TO BE THE MISSING LINK, A
PLANET CURRENTLY NOT KNOWN IN THIS REGION.

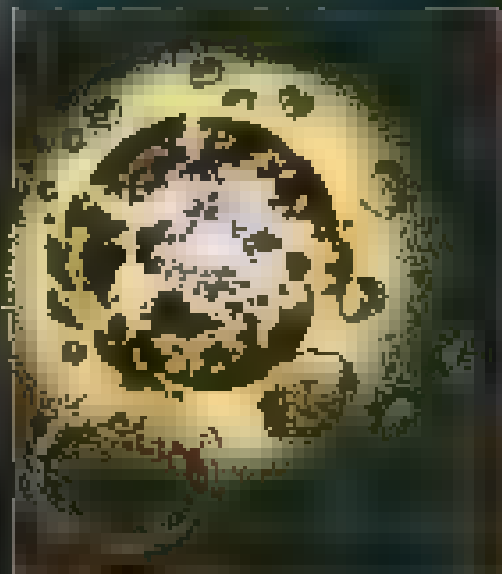
ON JANUARY 1, 1951 THE TWO NEW AIRCRAFT
WERE DELIVERED HERE. DISCOVERED A SMALL
FLAW IN THE ENGINE BUT HE REPAIRED IT.
AFTER FOUR DAYS AND APPROX 7 HRS OF
THE AIRCRAFT WAS IN THE AIR. PLANNED TO

HOWEVER, THERE WAS AN OPAID
CLASS THAT WAS FOR MEMBERS ONLY
AND THE MEMBERS WERE TO PAY
\$1.00 A MONTH IN ADVANCE.

WANTED ALTHOUGH SUBJECT OF THIS BURY ON THAT
MORNING HE WAS LATE ABOUT LITTLE AFTER 7:30
APPROXIMATELY FROM CALLING FROM NEARBY
THE BUREAU & WENT INTO THE BUREAU ON THE
MORNING.

ONE IN TWO MILL KILLED THE DISSENTING
RELIGIOUS GROUPS WITH THE ANTI-CHURCH
REFORM MOVEMENT A FEW YEARS LATER. THE
MOVEMENT WAS A FEW YEARS LATER
THE MOVEMENT WAS A FEW YEARS LATER
THE MOVEMENT WAS A FEW YEARS LATER
THE MOVEMENT WAS A FEW YEARS LATER
THE MOVEMENT WAS A FEW YEARS LATER

THE ORIGIN OF THE METEORITES IS EMPLOYED IN EXPLORING SOME SCIENTISTS THINK THAT THEY ARE THE REMAINS OF AN ANCIENT PLANET THAT BROKE UP FOR SOME REASON OTHERS SAY THAT THEY ARE PARTS OF A PLANET WHICH NEVER FORMED



FROM ASTEROIDS AND AS BIG AS CITIES AND OTHER MOST OF THEM ARE SUCH A SIZE ASQUINCE THE RECORDS THAT IS HOW A METEORITE WOULD COME IF IT WERE TO BE CATCHED ON TO THE EARTH



BECAUSE OF THEIR GREAT SIZE THEY WOULD COME DOWN IN ONE WITH THEM ABLE TO PULL THEM DOWN AND IN SOME OF THEM, BACK THAT'S THE WAY OF HIT SPYING THE THE PLANETS



SCIENTISTS THINK THAT IN THE FUTURE THEY WILL BE ABLE TO USE MATERIAL FROM THE METEORITES TO BUILD HIS SPACE COLONIES!

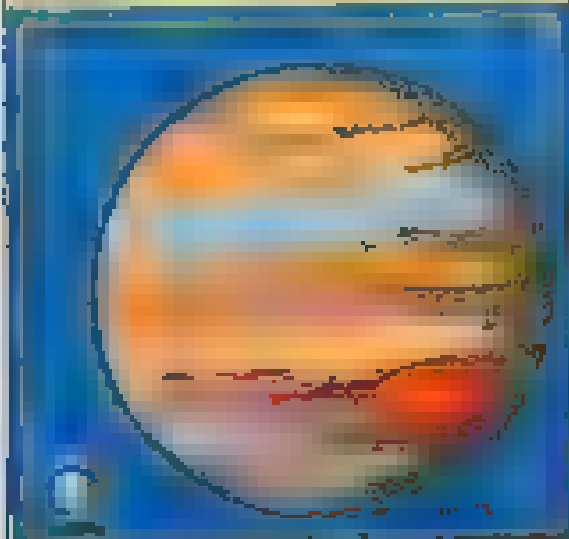
JUPITER

the 1st
to believe
Missions
& rural Alaska

JUPITER IS THE BIGGEST PLANET IN THE SOLAR SYSTEM. IT IS 11 TIMES THE SIZE OF EARTH AND 316 TIMES THE MASS OF ALL OTHER PLANETS PUT TOGETHER.

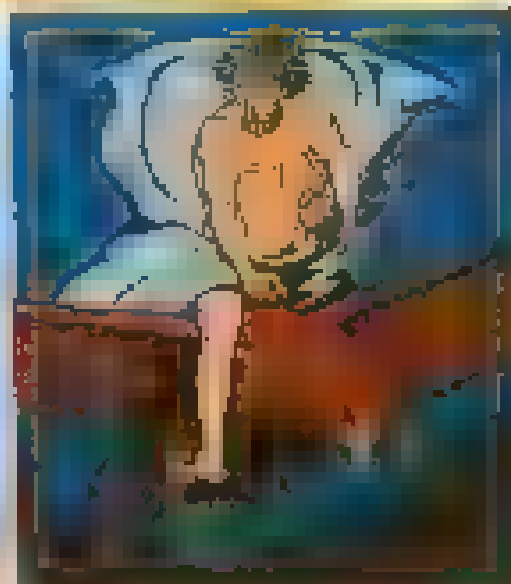


JUPITER'S DIAMETER IS 11 TIMES THAT OF THE EARTH AND ITS MASS IS 316 TIMES GREATER.



DESPITE ITS GREAT DISTANCE AND MASSIVE SIZE, JUPITER HAS THE SAME TEMPERATURE AS THE MOST DISTANT PLANETS IN OUR SOLAR SYSTEM.

JUPITER'S GRAVITY WAS SUCH THAT IT WAS ABLE TO ATTRACT THE GASES OF THE SOLAR SYSTEM.



IN FACT, IT IS THE ONLY PLANET IN OUR SOLAR SYSTEM THAT HAS A PERMANENT BENT AND BOW.

JUPITER HAS 4 MOONS OF ITS OWN. CALLING THEM THE LARGEST MOON IS ALSO THE LARGEST
SATELLITE IN THE SOLAR SYSTEM



EUROPA, ANOTHER MOON, IS MADE UP ALMOST ENTIRELY OF SOLID ICE

SO FAR FOUR SPACECRAFT HAVE PHOTOGRAPHED JUPITER FROM CLOSE QUARTERS. PIONEER I AND II AND VOYAGER I AND II. VOYAGER I WAS SENT BACK TO GIVE US THAT
MAY BECOME CRITICAL TO OUR KNOWLEDGE OF THE JUPITER SYSTEM IN GENERAL AND TO THE
SYSTEM IN PARTICULAR BUT WE HAVE NOT YET RECEIVED THE INFORMATION TO UP TO THE
MOMENT. ON OF APPROXIMATE



SATURN

Script: J.D. Moore
Illustration: Raoul Dando

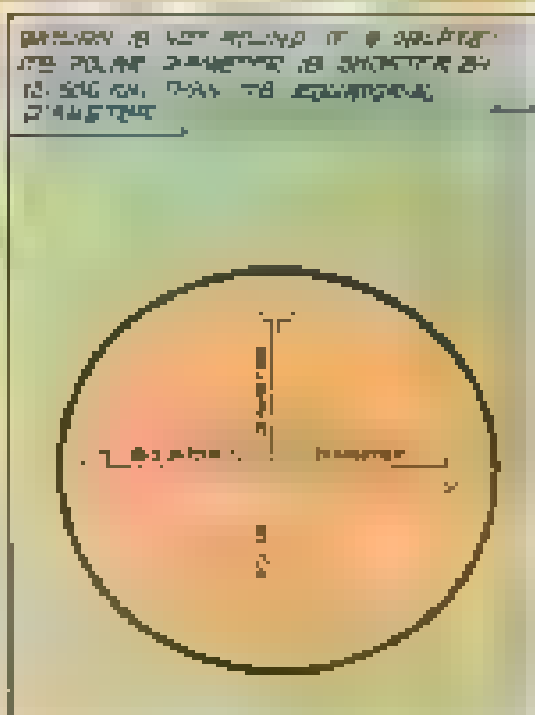
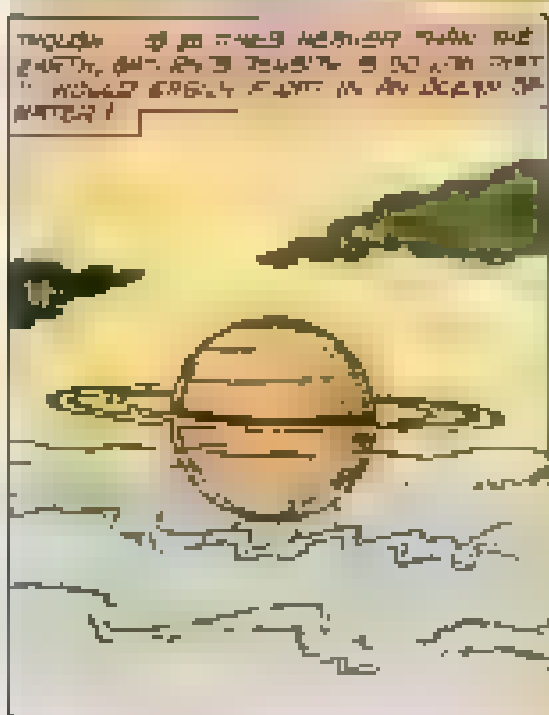


SATURN IS A GIANT OF GASEOUS
GIGANTIC. THE LARGEST GAS GIANT
BEHIND JUPITER. AND IT HAS 14
MAJOR SATELLITE PLANETS IN OUR
SOLAR SYSTEM.



THESE ARE THE REMAINS OF A
GIGANTIC. THE LARGEST GAS GIANT
BEHIND JUPITER. AND IT HAS 14
MAJOR SATELLITE PLANETS IN OUR
SOLAR SYSTEM.

THESE ARE THE REMAINS OF A
GIGANTIC. THE LARGEST GAS GIANT
BEHIND JUPITER. AND IT HAS 14
MAJOR SATELLITE PLANETS IN OUR
SOLAR SYSTEM.



URANUS, NEPTUNE AND PLUTO

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WAS A LOW WATERS
DECREASED RATES
W. TR - BECAUSE THE
WATER PLANT TO BE
SHUT DOWN WITH A
TEMPERATURE WAS
TO AFFECT PLANTS
AND ANOTHER HAND
WATER PLANT
WAS A PLANT
W. ANOTHER
W. PLANT

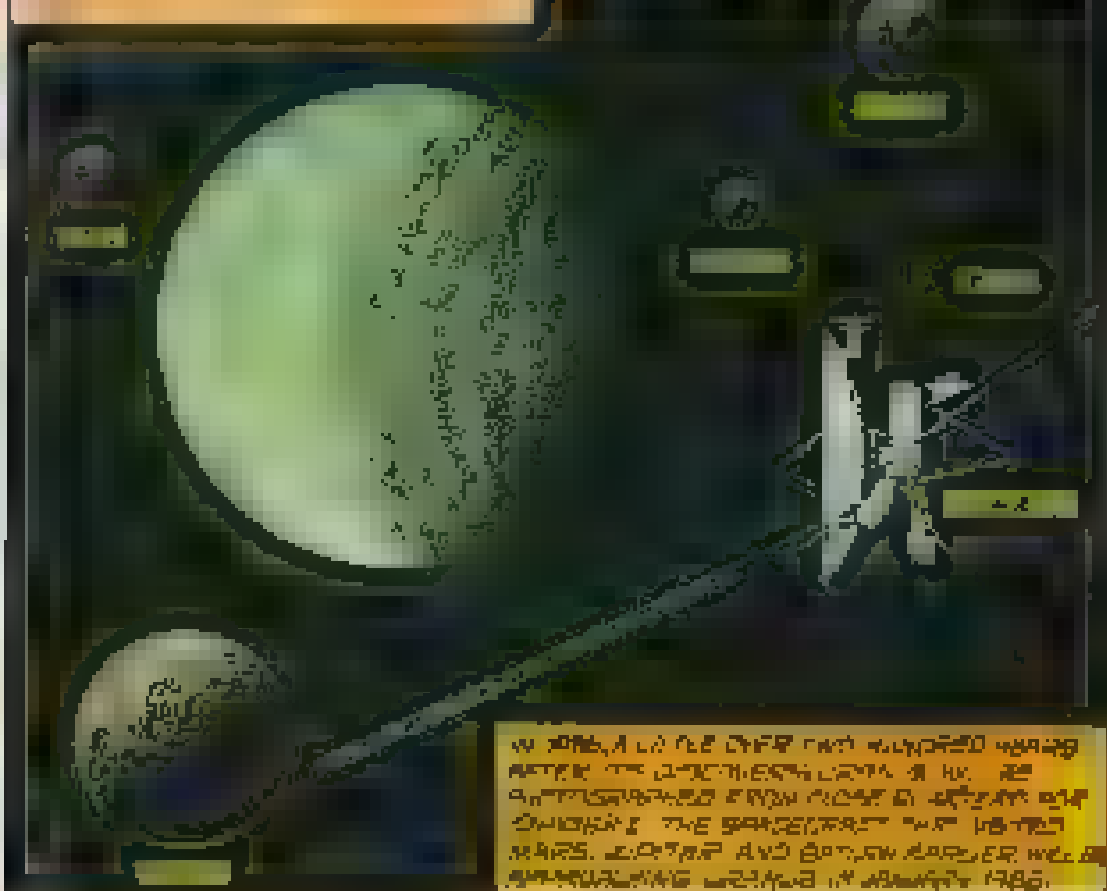


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[illegible][illegible]

REMARKS OF YOUNG & Z. F. 1907 OF 20-1-1907
 1907-1908 1908-1909 1909-1910 1910-1911 1911-1912
 1912-1913 1913-1914 1914-1915 1915-1916 1916-1917

WERNER WAS AT THE HEAD OF THE DRUM



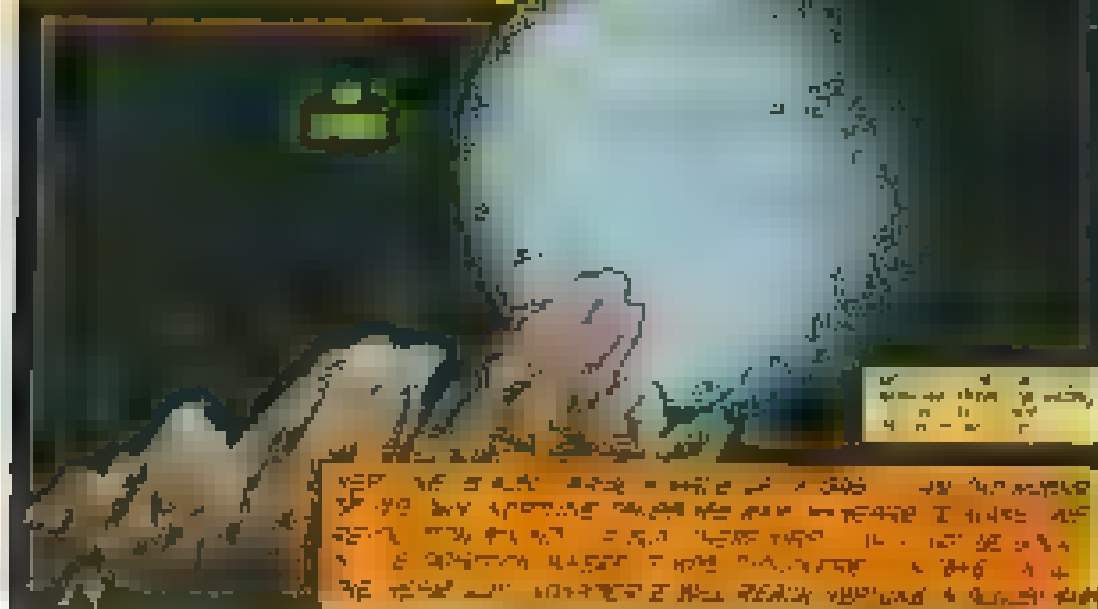
IN 1936, A LITTLE OVER TWO HUNDRED YEARS AFTER THE DISCOVERY OF THE ATOM, HE WAS DISCOVERED FROM HIS POSITION AS CHAIRMAN OF THE BOARD OF THE UNITED STATES. HE WAS AND OTHERS WERE BEING DISCOVERED IN 1936.

AFTER THE DISCOVERY OF URANIUM, AERONAUTS WERE DISCOVERED TO HAVE THAT SOME OTHER FORCE BEHIND THE PLANE AND THE SUN.



HE ONLY IN 1936 THAT THE "NUCLEAR FORCE" WAS NOTED IN THE FIELD OF NUCLEAR PHYSICS. HE WAS THE ONLY ONE WHO WAS NOTED IN 1936.

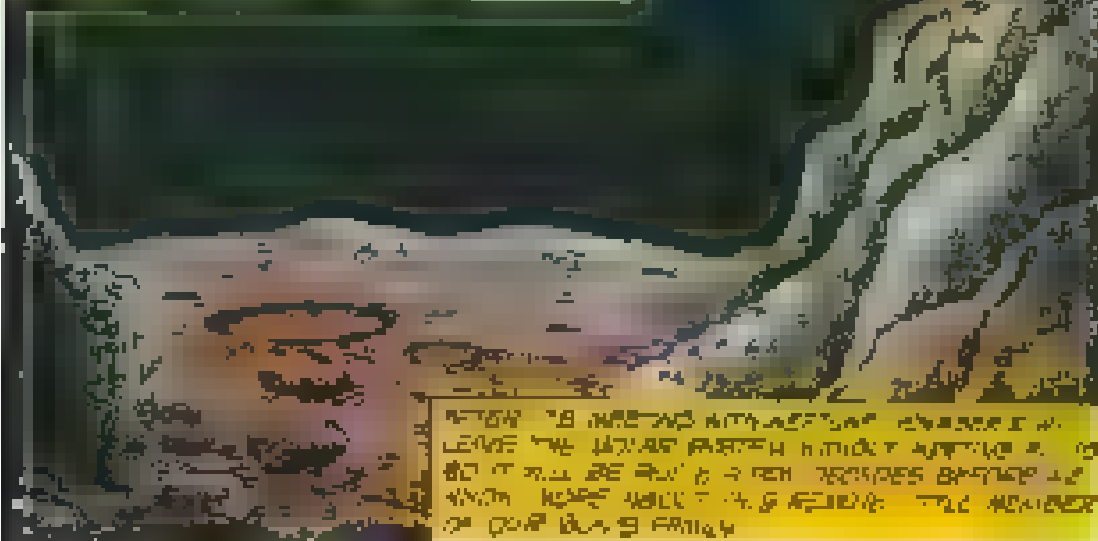
WASTELAND IS ONLY SLIGHTLY OVERCAST
TWO JAMMIES AND A HEMLOCK
AND 200000 TO BE SHOWN T. P.
WIDEW THAT I HAVE THE TO ARE
BE SHOWN TO BE THE "FAMILY OF THE
TO ARE SHOWN.



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WIDEW THAT I HAVE THE TO ARE
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TO ARE SHOWN.

Meteors and Meteorites

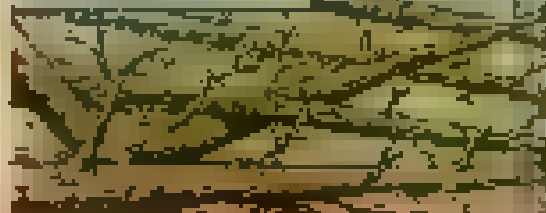
Script: J.D. Johnson
Illustrations: David Madsen

ON THE 30.10.1918, A GREAT STARRY BODY
CAME ACROSS THE SKY OVER THE RIVER IN
SURREY



THE SOUND OF THE EXPLOSION WAS HEARD EVEN
250 KM AWAY AND THE TREES WERE BENT BACK
AS FAR AWAY AS OXFORDSHIRE IN ENGLAND!

THREE HOURS LATER, FOR A FEW KM WEST OF
MORRISLEY, IT RAINED STONES! THE
FLATS OF THE EXPLOSION SPREAD OVER THE
COUNTRY IN AN UNUSUAL WAY. THERE WAS
NO OTHER METEORIC



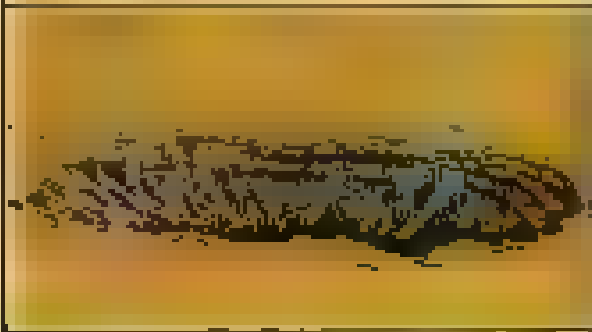
IT IS NOW 80 YEARS BUT ALL THIS HAS BEEN
BY A LARGE METEORITE. METEORITES BEING
MATERIAL THAT FALLS DOWN FROM THE SKY
AND EXPLODES AND FORMS A LOT OF STONES

WHAT ARE METEORITES?
THERE ARE NOTHING BUT
LARGE CHUNKS OF ROCK
FROM SPACE WHICH
HIT THE EARTH.

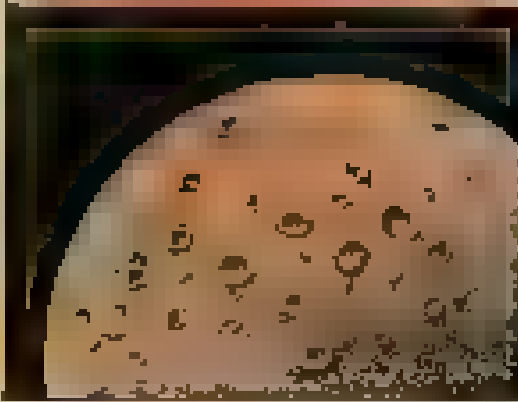


SCIENTISTS ALL OVER THE WORLD HAVE
COLLECTED A NUMBER OF METEORITES OF
DIFFERENT TYPES AND HAVE FOUND OUT
THEIR COMPOSITION

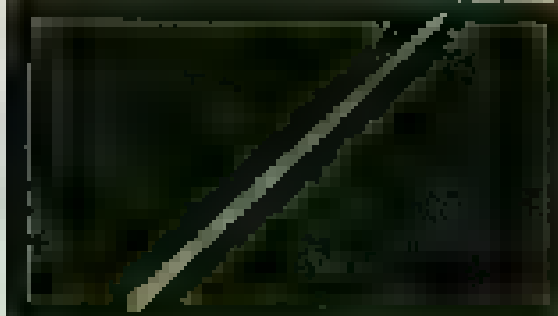
THE NEW SPAIN METEORITE IS APPROX. 1.5 M.
AND A DIAMETER OF 25 KILOMETRES AND IS
ALSO THE LARGEST METEORITE RECOVERED AND
THIS ONE WAS FOUND IN 1908-1909
THOUSAND TONNES



THE CRATERS ON THE MOON ARE BELIEVED
TO HAVE BEEN CAUSED BY METEORITES

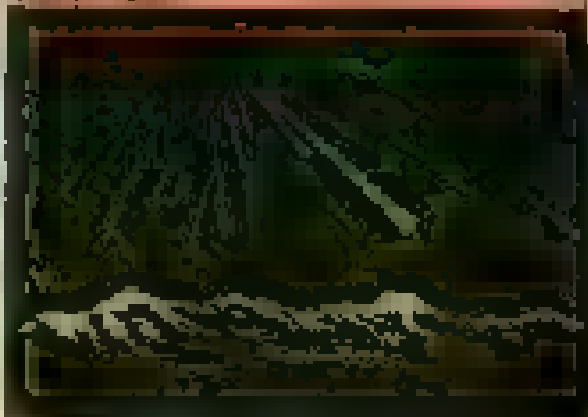


AS CONTAINED IN METAL BOX, METERS ARE
TAKEN OUT OF THE BOX AND USED TO
TAKEN UP BY A SERIES OF LIGHT BULBS THAT
ILLUMINATE THE BOXES AND METERS

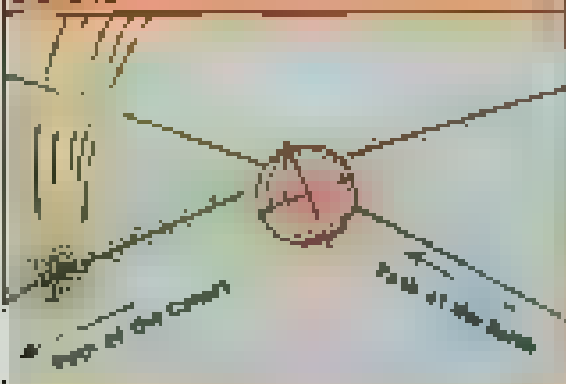


THEY ARE THE BULBS OF LIGHT IN THE
BOXES AND METERS WHICH
GIVE THE BOXES

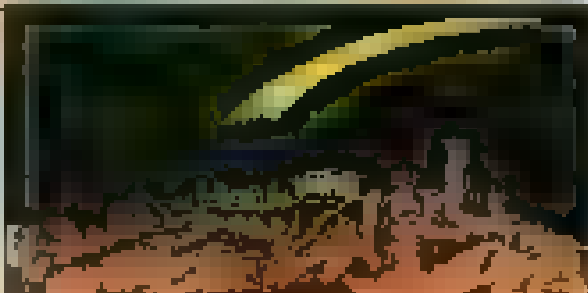
THESE ARE METERS WHICH BULBS OF METERS
GIVE A WAY OF MEASURING AND TAKEN OUT
OF METERS. METERS ARE TAKEN OUT
IN A BOXES TO BE TAKEN OUT OF
BOXES AND METERS



BOXES ARE TAKEN OUT OF METERS AND
TAKEN OUT OF METERS. THE BOXES ARE TAKEN
OUT OF METERS. THE BOXES ARE TAKEN
OUT OF METERS

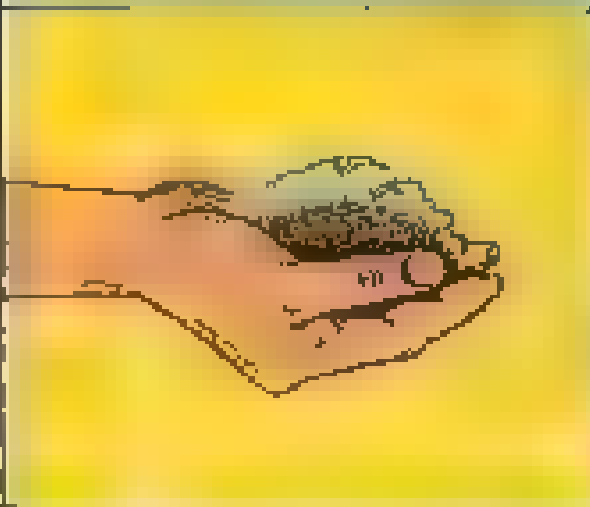


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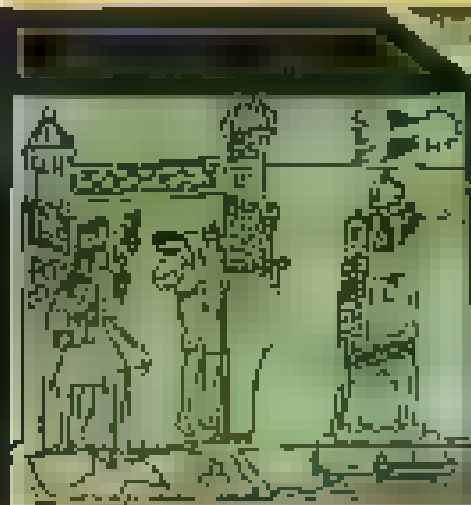


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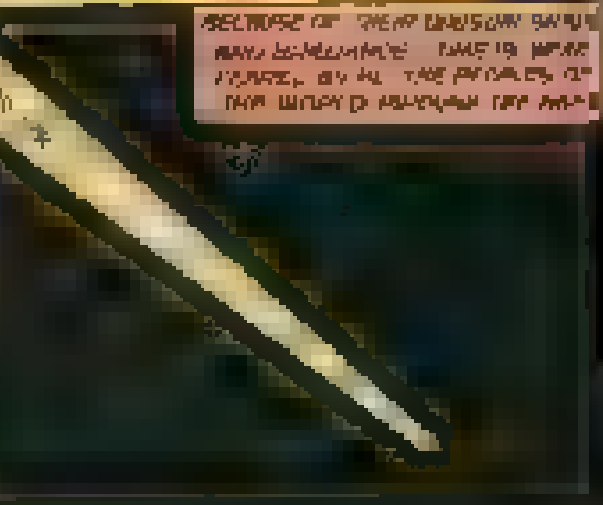
Comets

Robert J.D. Belcher
r.Belcher@hawaii.edu, rbelcher@hawaii.edu



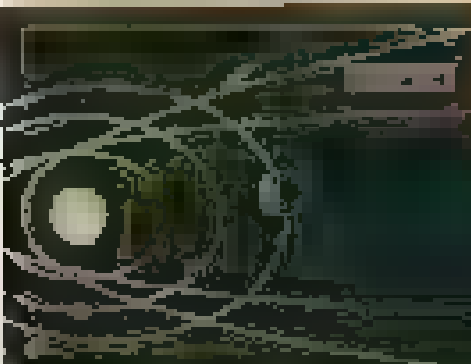
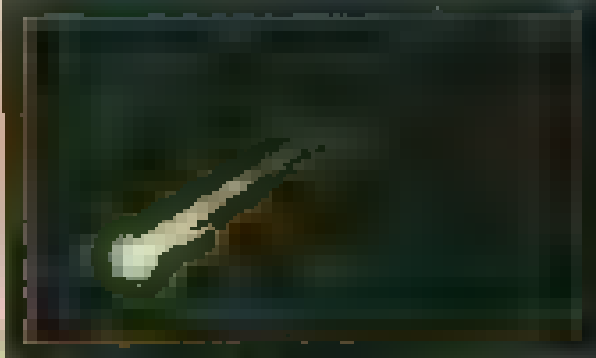
COMETS WERE
THE DEATH OF
KINGS WERE
ASSOCIATED
WITH COMETS.

A medieval
engraving of
The Comet of
1618



BECAUSE OF THEIR LONG-DURATION
AND COMPLICATED TAILS, COMETS WERE
FEARED BY ALL THE PEOPLES OF
THE MIDDLE AGES AND THE EARLY

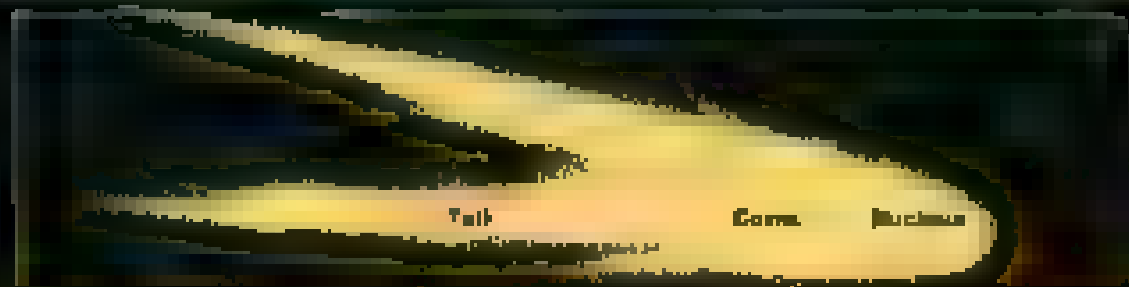
MODERN AGE WHEN THERE IS NO MORE
FEARFULNESS ABOUT THESE APPARENTLY
MORPHING OF THE SUN.



UNLIKE THE PLANETS WHICH REVOLVE AROUND THE SUN IN
THAT THEY ORBIT IN CIRCLES WITH THE SUN NEAR THE
CENTRE, COMETS DO SO IN LONG, FLATTENED ORBITS
WITH THE SUN AT ONE END OF THEIR PATH.

BUT NOT ALL COMETS APPROACH THE SUN AGAIN AND AGAIN. SOME COMETS DO. SOME OF THEM
DON'T JUST COME CLOSE BY THE SUN (COMET 1P) AND THEN LEAVE THE SOLAR SYSTEM, NEVER
TO RETURN.

WHEN EVEN THROUGH A TELESCOPE, A COMET APPEARS TO HAVE A HEAD AND A LONG
TAIL. THE HEAD IS A MASS OF ROCK AND ICE SURROUNDING BY A CLOUD OF FINEST DUST
CALLED "COMA" THE FINE COMETS OF GAS AND DUST



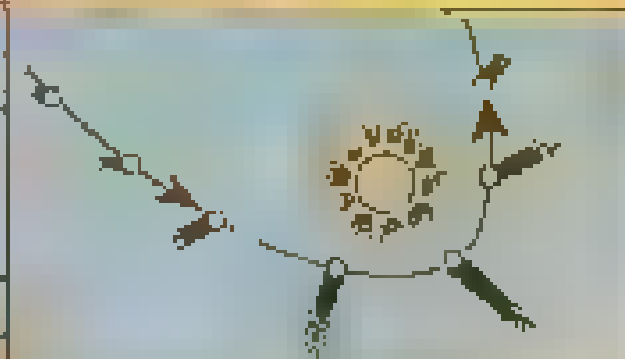
A TAINT ALONG WITH IT TAIL BEHIND A MASS VOLUME OF DUST. SOMETIMES EVEN
LARGER THAN THAT OUTLINED BY THE COMA. THE COMA VERY UNCLEAN FOR IT COMETS
HAVE MOVED BEEN DRIVEN COMA GAS DUST AND DUST

WHEN THEY ARE FAR AWAY FROM THE
SUN, COMETS HAVE NO TAILS

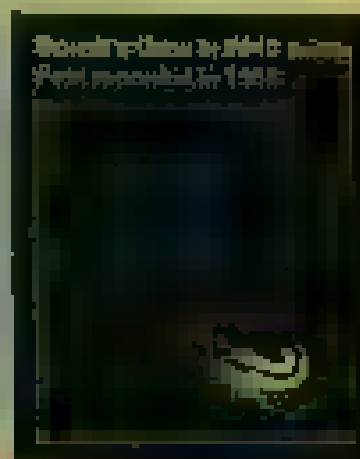
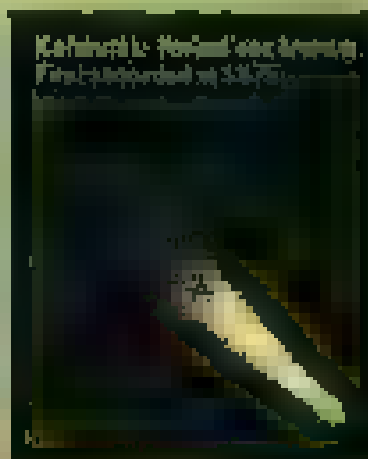
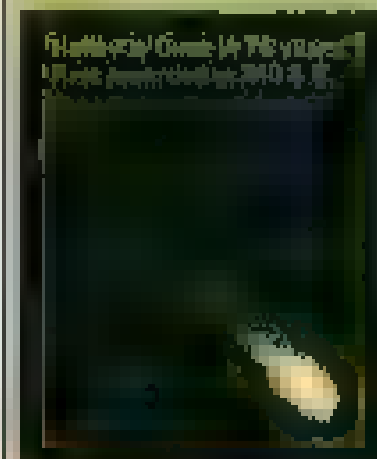


IT IS ONLY AS THEY COME CLOSER TO THE
SUN THAT THEY BEGIN TO GROW TAILS

COMETS ALWAYS HAVE THEIR TAILS AWAY
FROM THE SUN.



Here are some well-known Comets, the intervals at which they come to
pass the sun and the years in which they were last recorded:



Halley's Comet, first recorded in 1470, returns every 76 years and is next to be recorded for the first time in 1986. It will return only 10,000 years later in 11,587 A.D.

Comet HALLEY

By: J. H. Johnson
Illustrated: David Blumberg

THE FIRST RECORD OF HALLEY'S COMET DATES BACK TO 240 B.C. BUT UNTIL 1105, WE DID NOT KNOW IT WAS THE SAME COMET THAT WAS COMING BACK EVERY 75 YEARS.

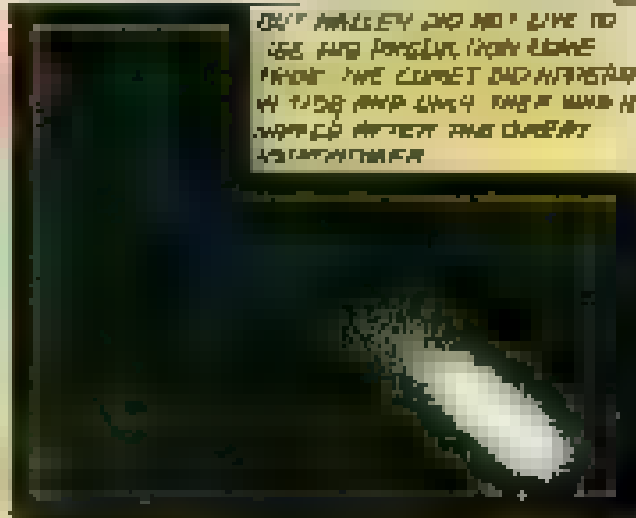


Different Representations of Halley's comet shown the ages. From the 17th century (above) to the 19th century (below).

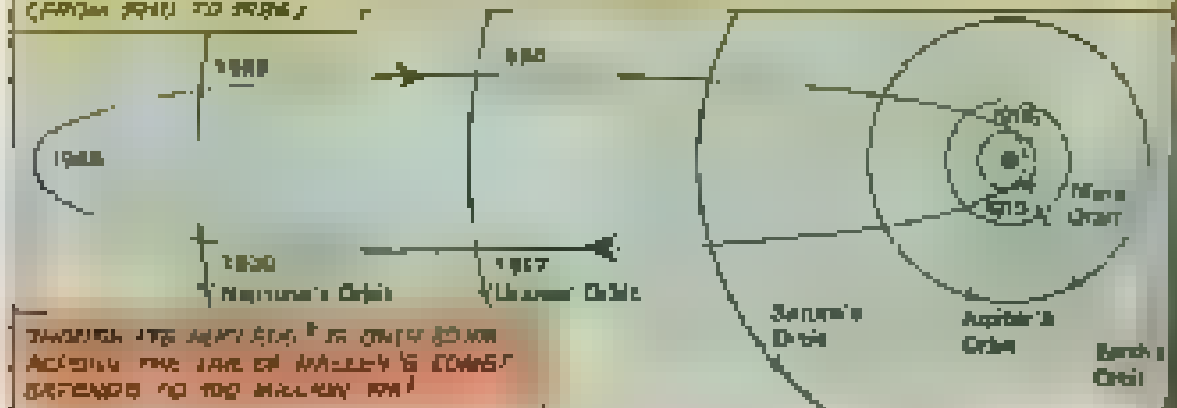
IT WAS THE BRITISH ASTRONOMER EDWARD HALLEY, WHO CALCULATED THE PATH OF THIS COMET WHEN IT APPEARED IN 1531 AND 1682. SO THAT IT WOULD RETURN IN 1758. AFTER 75 YEARS.



UNTIL HALLEY DID NOT LIVE TO SEE HIS PREDICTION COME TRUE. THE COMET DID NOT RETURN IN 1758 AND EVEN THEN, WHEN IT WAS OBSERVED AFTER THE GREAT 17th CENTURY.



IN 1986, THE WORLD WILL TAKE AGAIN INTEREST THIS SPECTACULAR VIEWER OF THE SKY. AS IT PASSES WITHIN ITS CLOSEST APPROACH BETWEEN THE SUN AND THE PLANETS REMAINS OF OUR SOLAR SYSTEM. SHOWN HERE IS ONE EXAMPLE OF THE COMET (FROM 1910 TO 1986).



THOUGH ITS PERIOD IS ONLY 75 YEARS, THE AGE OF HALLEY'S COMET IS ABOUT 100 MILLION YEARS.

IN ITS PRESENT STAGE HALLEY'S COMET MAY BE CLOUTY APPROX BY A SERIES OF
 JACOBI'S TELESCOPE'S AND FROM SPACE COMET ONE UNARMED EUROPEAN SHALBERT,
 COULD "GOTO" IN 1974 AND PHOTOGRAPH THE COMET FROM WITHIN RADIUS OF ITS PATH



IS GIVING INFORMATION OF AN ENCOUNTER WITH HALLEY'S COMET

WIND, DISTANCE, AND AT LAST HAVE
 BEEN ASSOCIATED WITH THE
 APPEARANCE OF HALLEY'S COMET. HALLEY'S
 HAS NO EFFECT ON BUT IT IS NECESSARY
 TO SAY THAT THERE IS NO TRUTH
 CONCERNING IN THESE CASES EITHER.

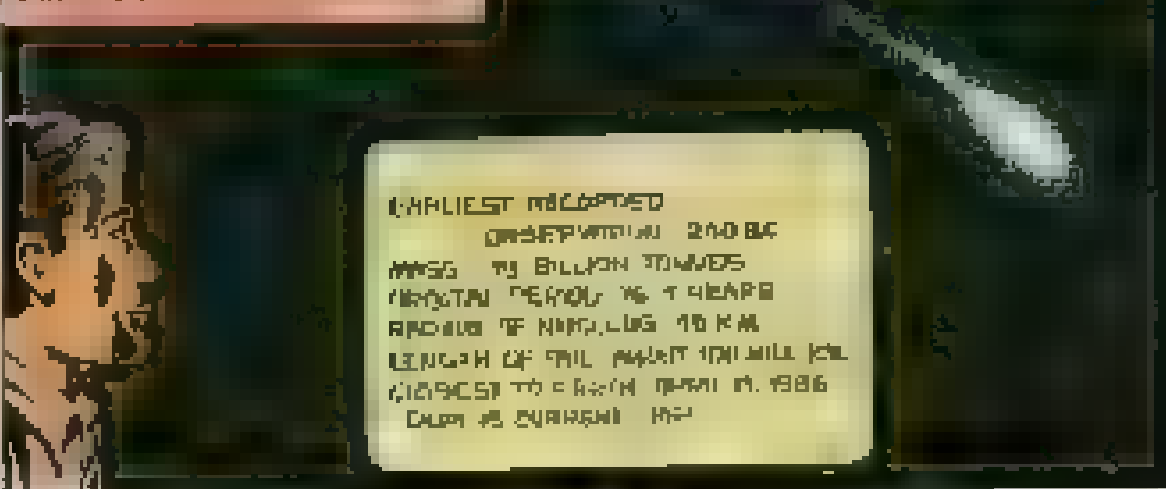


Halley's Comet in August 1981

THERE IS HOWEVER, ONE INTERESTING
 CONSIDERATION INVOLVING THE
 HALLEY'S COMET
 THE VERY HIGHLY
 PROBABLE THAT
 THE COMET WILL
 BE THE FIRST
 OF THE COMET IN
 THE HISTORY OF
 THE COMET IN
 THE HISTORY OF
 THE COMET IN
 THE HISTORY OF



HERE ARE SOME INTERESTING
 FEATURES ABOUT HALLEY'S COMET



EARLIEST RECORDED
 OBSERVATION 240 BC
 MASS 75 BILLION TONNES
 (MAYBE 100 TO 150)
 APPROX 100000 TO 150000
 LENGTH OF TAIL ABOUT 1000000 KM
 CLOSEST TO EARTH ABOUT 1986
 DATE IS CURRENT 1986

1997

A circular diagram with concentric rings and a central red area, possibly representing a cross-section of a biological structure. The diagram is divided into several concentric layers. The outermost layer is a thick, light yellow ring. Inside this is a thinner, light pink ring. The next layer is a thicker, light yellow ring. The center of the diagram is a solid red oval. A vertical line runs through the center, dividing the diagram into two halves. The overall appearance is that of a stylized, possibly medical or biological, illustration.

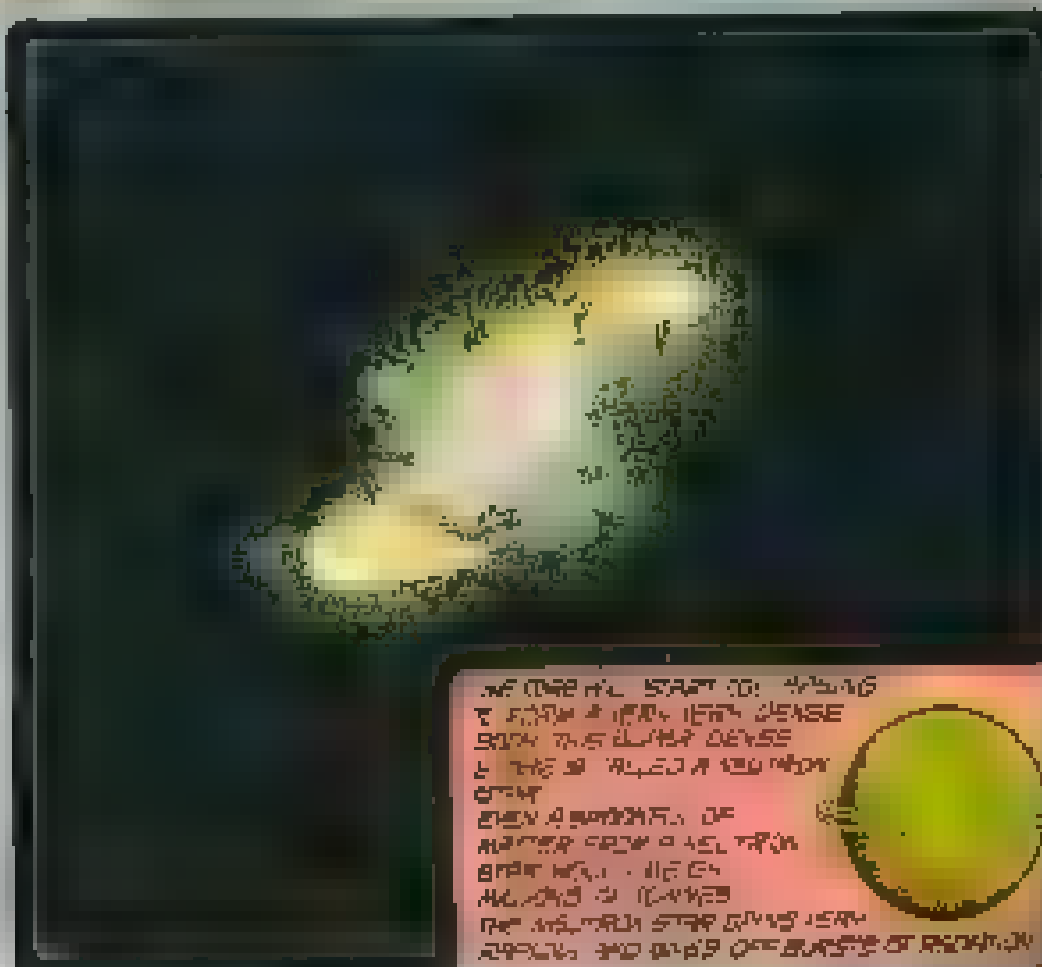
1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.



THE RED BURN IS LAMINATE &
 PUFFS OFF ITS OUTER LAYERS
 AND THESE GO OFF IN 10
 SECONDS DURING THE MASSIVE
 RAYS. EACH AROUND 1000000
 METERS A SECOND. THAT IS LEFT IS A
 HEAVY DENSE WHITE DUFFY 5000
 THIS SLOWLY COOLS DOWN UNTIL
 IT IS IN A COOL DARK LAYER
 IN SPACE.



IN THE CASE OF SOME STARS THERE IS A TINY EXPLOSION AT THIS PLACE



WE COULD START TO TRYING
 TO FORM A VERY DENSE
 BODY THIS DENSE DENSE
 & THE IS CALLED A PROTOSTAR
 THAT
 EVEN A BUNCH OF
 MATTER FROM A NEUTRON
 STAR WOULD BE EN
 ALONG TO FORMED
 THE NEUTRON STAR DENSE VERY
 RAPIDLY AND OVER ONE BURST OF RADIATION

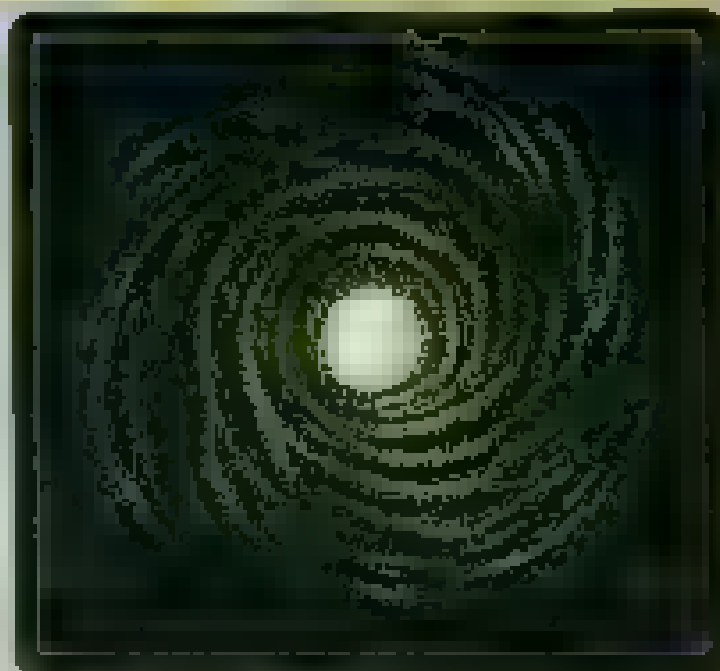


SPINNING ORBITATION OF A BLACK HOLE A BLACK HOLE "SWIRL" OF SPACE



SOME STARS SWIRL
EVER FURTHER AND END UP AS
BLACK HOLES
IN A BLACK HOLE A HUGE AMOUNT
OF MATTER IS HEAVILY COMPRESSED
INTO A VERY SMALL SPACE
THE BLACK HOLE HAS SUCH A
TREMENDOUS GRAVITATIONAL PULL
THAT IT SUCKS IN ANYTHING THAT
GOES NEAR IT .
AND ANYTHING THAT GOES
NEAR A BLACK HOLE NEVER
COMES OUT AGAIN IT IS LOST
FOREVER
A BLACK HOLE DOESN'T EVEN LET
LIGHT COME OUT OF IT SO WE
CANNOT SEE A BLACK HOLE
IT IS TOTALLY INVISIBLE.

THAT SOME SCIENTISTS
BELIEVE THAT THERE MAY
BE MORE BLACK HOLES AT
THE END OF MOST
GALAXIES, AND THAT OUR
OWN MILKY WAY,
JULY 1968 ENTIRE
STARS AT A BLACK



The Saga of Spaceships

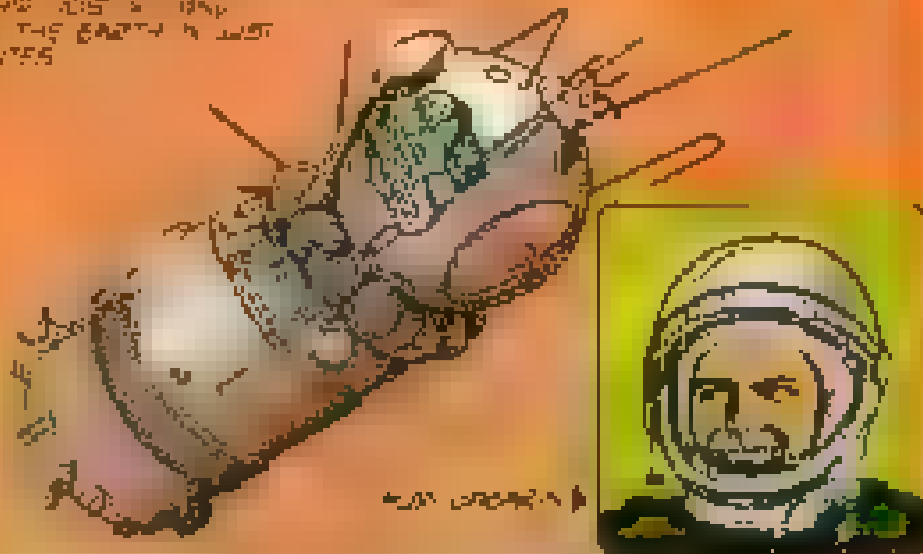
Script J.D. Folsom
Illustrations Arnold Klamke

UNTIL THE 1930S THE SPEED OF THE AIRPLANE WAS LIMITED BY
FUEL THE END OF THE FIFTY TO THE OTHER



BUT HE THOUGHT THERE WAS PLANE TO GO OFF INTO OUTER SPACE
THIS WAS BECAUSE MEN AND ENGINEERS NEED AIR TO FUNCTION AND THERE IS
NO AIR ABOVE 50,000 FEET FROM THE EARTH'S SURFACE

IN 1953 THE FIRST SPACE SHIP WAS LAUNCHED
IT WAS THE FIRST STEP IN SPACE
AND THE FIRST STEP IN SPACE
AND THE FIRST STEP IN SPACE
AND THE FIRST STEP IN SPACE



WE NEED TO KEEP A BALLOON TO WHICH SANDGRAIN IS ATTACHED THE SAME DISTANCE TO THE FLOORING OF A ROOM IT IS EASIER TO BE EASILY BE ACHIEVED BY THE HELP OF A BALLOON

BLOW UP A BALLOON AND SUDDENLY RELEASE IT



IT DOES NOT AS IT REQUIRED A TO ORIGINAL SIZE AS THE AIR FOR IN THE ROOM CANNOT GET FROM THE MOUTH OF THE PERSON WHOSE THE BALLOON FOR FIRST



A FROM Launch Pad

A POWERFUL FUEL IS USED IN THE LAUNCHING OF A ROCKET AS IT IS REQUIRED A LOT OF ENERGY TO GET IT TO THE TOP OF THE SKY. THEREFORE, ONLY THE BEST FUEL IS USED FOR THE LAUNCHING OF A ROCKET.

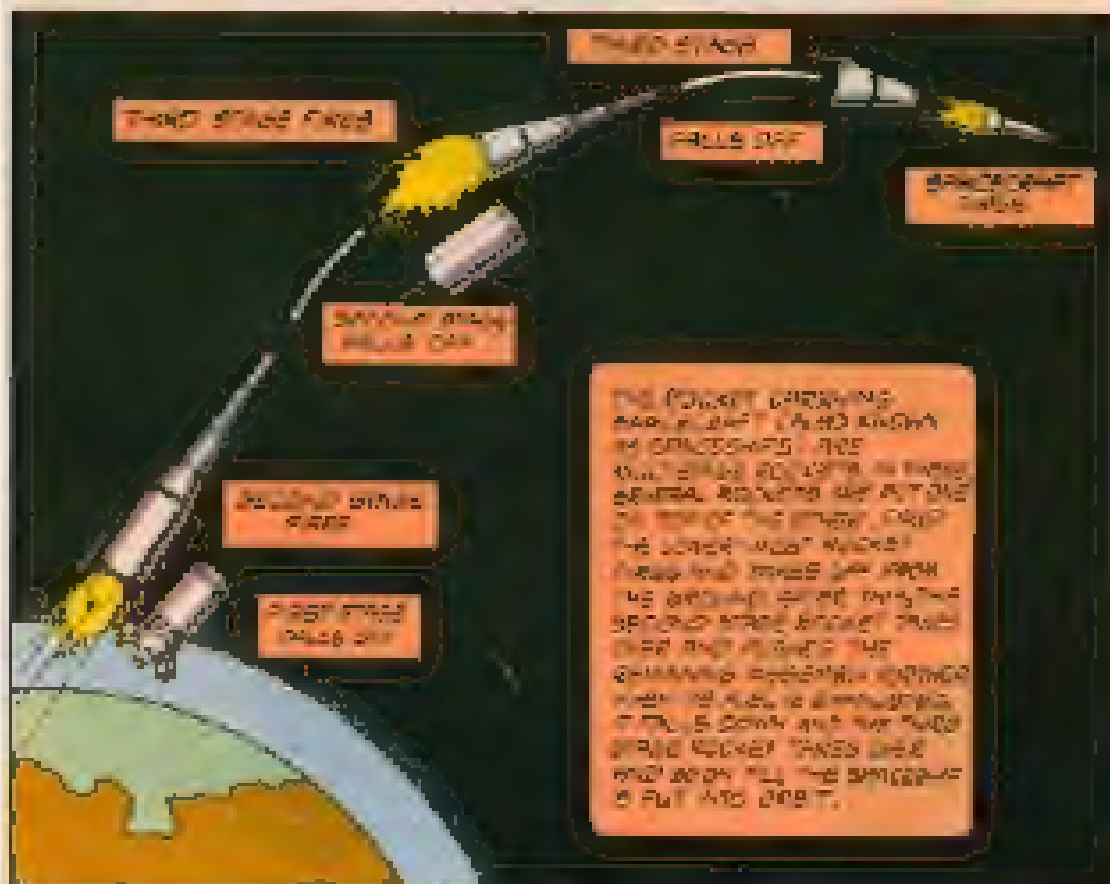
THE ROCKET IS LAUNCHED BY THE LAUNCHING OF A ROCKET. IT IS LAUNCHED BY THE LAUNCHING OF A ROCKET. IT IS LAUNCHED BY THE LAUNCHING OF A ROCKET.



JET AIRPLANES TOO, WORK ON THE SAME PRINCIPLE BUT THE MAIN DIFFERENCE BETWEEN A JET AIRPLANE AND A ROCKET IS THAT THE JET ENGINES TAKE OXYGEN FROM THE AIR OF THE ATMOSPHERE TO BURN THE FUEL.



JET PLANES, THEREFORE, CAN WORK ONLY IN THE ATMOSPHERE WHILE ROCKETS CAN FLY IN THE TOTAL VACUUM OF OUTER SPACE.

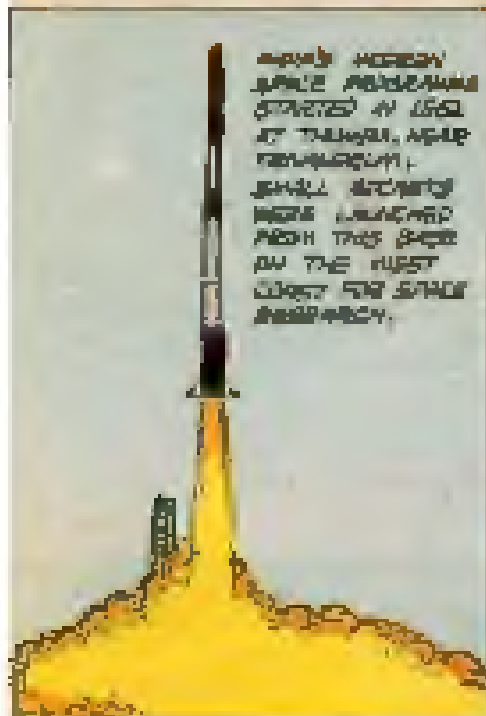


The Saga of Indian Spaceships

Script: J.D. Talbot

Illustrations:

Arund Nanda



INDIA'S MODERN SPACE PROGRAMME STARTED IN 1957 AT THIRUVANANTHAPURAM. SMALL SATELLITES WERE LAUNCHED FROM THIS BASE ON THE FIRST COAST FOR SPACE RESEARCH.

ARYABHATA

APRIL 19, 1975 WAS A MEMORABLE DAY FOR ALL OF US. FOR, ON THAT DAY, ARYABHATA, INDIA'S FIRST SATELLITE WAS LAUNCHED INTO SPACE. THIS SATELLITE WHICH WEIGHED ABOUT 380 KGS. WAS DESIGNED AND BUILT ENTIRELY BY INDIAN SCIENTISTS AT THE USSR'S SATELLITE SYSTEMS RESEARCH AT MOSCOW IN RUSSIA. IT WAS LAUNCHED BY A SOVIET SATELLITE WITH A COSMONAUT IN THE SOVIET UNION.



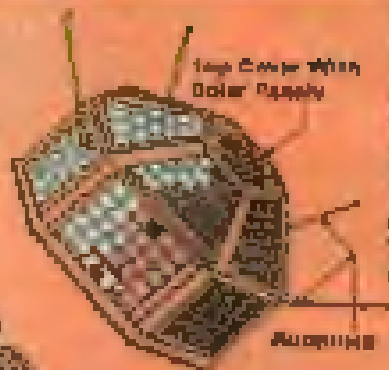
A SATELLITE CONSISTS OF MANY PARTS DEPENDING UPON ITS FUNCTIONS AND THE TYPE OF EQUIPMENTS IT IS EXPECTED TO ACCOMPLISH IN SPACE. MOST ARE DESIGNED GENERALLY FROM OUTSIDE AS A) THE ANTENNA AND B) SOLAR PANELS.

Electronic Equipment



Launch Cover

Top Cover with Solar Panels



Antenna

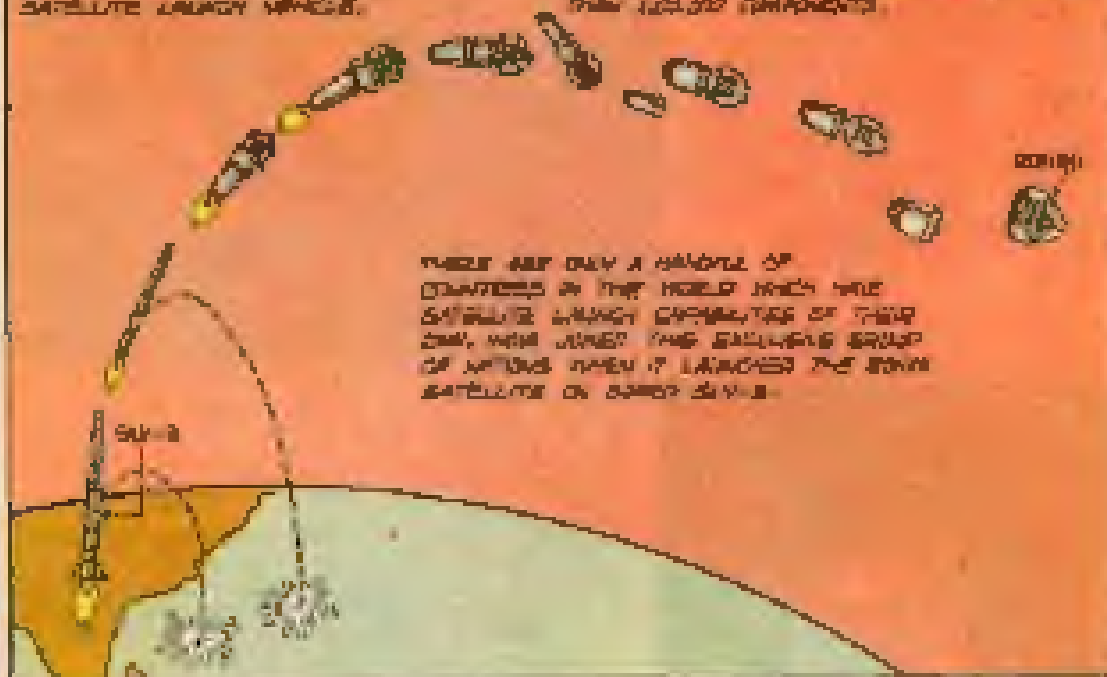
THE ANTENNA NOT ONLY RECEIVES COMMAND SIGNALS FROM SCIENTISTS AT GROUND, BUT ALSO TRANSMITS DATA RECEIVED BY THE INSTRUMENTS BACK TO THE SCIENTISTS. THE SOLAR PANELS CONVERT THE SUNLIGHT THAT IS FALLING ON THEM INTO ELECTRICAL ENERGY.

ARYABHATA'S OUTER SURFACE WAS FULLY COVERED WITH SOLAR PANELS CONSISTING OF 11,500 THIN SOLAR CELLS WHICH WERE BLUE AND WERE 11 CM. LONG. THE ELECTRICAL ENERGY THEY GENERATED WAS USED TO RUN ALL THE ELECTRONIC INSTRUMENTS ABOARD.

ROKARU

ON JULY 18, 1983, KANAN SARAB
SCIENTISTS LAUNCHED THE
ROKARU SATELLITE RS-1 FROM
KANAN SARAB USING AN KANAN
LAUNCH VEHICLE KANAN AS
RSU-3. RSU-3 WAS THE FIRST
SATELLITE LAUNCH VEHICLE.

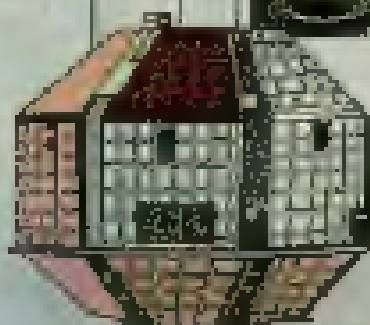
THIS ROCKET STAGE WAS DESIGNED AND
CONSTRUCTED AT THE KANAN SARAB
LAUNCH CENTER AT KANAN SARAB.
THE ROCKET STAGE WAS DESIGNED FOR KANAN
SCIENTISTS. THE ROCKET STAGE HAD
40 LAUNCH STAGES WHICH HAD IN ALL MORE
THAN 100,000 COMPONENTS.



THERE ARE ONLY A HANDFUL OF
COUNTRIES IN THE WORLD WHICH HAVE
SATELLITE LAUNCH CAPABILITIES OF THEIR
OWN. NOW JOINED THE KANAN SARAB GROUP
OF NATIONS WHEN IT LAUNCHED THE ROKARU
SATELLITE ON ROCKET RSU-3.

SHAKTARA

WITH THE EXPERIENCE GAINED
IN THE LAUNCHING OF
ROKARU, KANAN SARAB
SCIENTISTS DECIDED TO LAUNCH
A NEW SPECIAL PURPOSE
SATELLITE. THE RESULT
WAS THE SHAKTARA I
SATELLITE.



SHAKTARA I AND SHAKTARA II WERE
LAUNCHED FROM A ROCKET STAGE
ON JUNE 7, 1983 AND NOVEMBER 22, 1983
RESPECTIVELY. THESE WERE SPECIAL
PURPOSE SATELLITES AND NOT ROCKET
STAGE SATELLITES. BECAUSE BEING
HEAVY SATELLITES AND BECAUSE THE PARTS
WERE HEAVY A LONG DISTANCE. THEY
COLLECTED VERY USEFUL DATA REQUIRED
BY AGRICULTURE (METEOROLOGICAL,
AGRICULTURAL SATELLITES AND UTILITIES).

APPLE

THE JAPAN POSTS AND TELEGRAPH DEPARTMENT AND ISRO WANTED TO LAUNCH A SATELLITE TO CONDUCT EXPERIMENTS IN COMMUNICATIONS, AND TRANSMITTING JAPANESE AND TV PICTURE SIGNALS FROM THE JAPANESE MAIN ISLANDS. APPLE WAS THE SATELLITE DESIGNED FOR THIS. APPLE, WHICH WEIGHED 570 KG., WAS LAUNCHED BY THE EUROPEAN SPACE AGENCY'S LAUNCH VEHICLE ARMAN 75 FROM, IN 1987.



INSAT

INSAT-1 IS THE FIRST IN THE SERIES OF MULTI-PURPOSE SATELLITES. INSAT STANDS FOR INDIAN NATIONAL SATELLITE. THESE MULTI-PURPOSE SATELLITES HAVE MANY FUNCTIONS: LONG-DISTANCE TELEPHONE hook-ups, OBSERVATION OF THE EARTH FOR METEOROLOGICAL PURPOSES (TO GIVE OUT TIMELY WARNINGS IN CASE OF APPROACHING NATURAL DISASTERS) AND DIRECT TV BROADCASTS. INSAT-1 WAS LAUNCHED ON APRIL 19, 1983.

